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NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. The articles written by Mr. Raymond will be signed with a star.


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## HARDSCRABBLE LITERATURE.

LIKE a granite peak amid the undulating softness of green fields, so crops out the name of Hardscrabble on the map of Southern Colorado, surrounded by such smoothly-flowing Spanish titles as San Juan, Huerfano, Sierra Mojada, and Rosita. Of these, the former three are really legacies of Spanish tongues; but Rosita, we fancy, is an artifical imitation, an attempt to deck with paper flowers the forbidding crag of Hardscrabble. For Rosita is the capital of Hardscrabble district. In spite of its sentimental name, there is no Spanish languor about the place. In September, 1873, it consisted of 64 houses, and about 640 inhabitants; by January, 1876, the number of buildings had become 513, and the population numbered 1,600, with a liberal supply of schools, churches, shops, lawyers, doctors, scientists, a newspaper, and a bank. All this activity is based upon the silver mines of the district, which, though yet in the infancy of development, promise to be increasingly productive and profitable. One or two of them have been sufficiently worked to assure future prosperity. Rosita and her parent Hardscrabble, like all other active and industrious pioneers, have our earnest sympathy and our best wishes.

Our attention, at the present time, however, is chiefly attracted to the first literary product of the region (apart from the ephemeral issues of the periodical press) which has come to our notice. We refer to a work on "The Silver Region of the Sierra Mojada and Rosita," by CARL WULSTEN, C. and M.E., one of the U. S. mineral land surveyors of Hardscrabble. It contains a considerable amount of useful and interesting information concerning climate, routes, history, mining laws, etc., with a valuable topographical map. But all these features only render it an excellent guide to the traveler. What distinguishes it from other useful books of that class is its astonishing discussion of geological theories connected with the mining industry. It is a pity to mar, by inadequate quotations the effect of the author's fancy; but we must be content with a few selections from what he calls "an *abundance de richesse*, as the Frenchman has it."

Mr. WULSTEN adopts "the theory of HUMBOLDT, and other great naturalists," concerning the origin of mineral veins, as the "hypothesis, which, in a great many instances, has become a thesis." He does not quote any statement of their views; but his own notion, which he professes to base upon theirs, ascribes metalliferous veins to the direct intrusion of matter in igneous fusion. As opposed to this hypothesis, he recognizes and condemns another, "that the noble metals came into the fissure veins by *filtration*," which he ascribes to "COMSTOCK and other newer theorists." We have not the pleasure of COMSTOCK's acquaintance; we never heard of him as an authority on this subject. He is probably deceased; and it is well that he did not survive to see his hypothesis forever prevented from "becoming a thesis" by the triumphant logic of Mr. WULSTEN, who gives it the *blow de grâce*, "as the Frenchman has it," in the following style:

"Upon the other side, taking COMSTOCK's and other newer theorists' hypotheses as a new base line with which to start research—that the noble metals came into the fissure views by *filtration*—why is it that in the Nevada instances, the Consolidated Virginia, and other mines, have grown richer with acquired depth? If filtration is the *causa* of the existence of gold and silver in fissure veins, does filtration increase as depth is reached? A fissure, at the depth of one thousand feet from the surface, may be supposed to be hermetically closed. Now, if filtration is the mother of deposit, does it actually exist without the agency of oxygen?"

Perhaps if COMSTOCK (whoever he is or was) had a chance to reply, he would faintly suggest, before surrendering wholly, that filtration might exist very comfortably without oxygen; and he might add that "in the Nevada instances" the mines are often flooded with water, appearing at much greater depths than a thousand feet, and "filtrating" in a manner, the liveliness of which even oxygen could scarcely augment. But COMSTOCK, dead or alive, is "none of our funeral;" and we shall not attempt to patch up his damaged hypothesis into "a thesis." We prefer to consider the thesis which Mr. WULSTEN has learned from HUMBOLDT and others. It is not without its direct application to Hardscrabble, as the reader will perceive. Says the thesist (as the Frenchman would probably have it):

"In my conviction, the density of volume is the condition of value. Irregularity in quantity and quality is but the effect of the manner of producing the deposition. On one condition I am satisfied the richness of fissure-veins depends, to wit: that metal in its ore state must be formed whenever and wherever fissure veins are discovered to exist, and deposits have been found; and further, that crystallization is another necessary condition of existence of metal-bearing ores. Now the upheavals of Fremont County are in condition to show the above reasoning. Wherever metal-bearing ores have been found in this district, they have been located in volcanic matter. They have shown heat conditions and crystallization, and wherever fissure veins have been found they have shown metal life from the surface."

After citing several Rosita mines which have, as they were developed in depth, "gradually, permanently, and unabatingly evinced increase of density of volume, and with it increase in value," Mr. WULSTEN takes a deeper plunge, improving in "density of volume" as he goes down. He declares:

"That the volume of metal-bearing matter upheaved and its richness depend greatly upon the momentum used for the production of the upheaval. In other words: If an upheaval has been effected—if metal-bearing matter has been forced to the surface through fissures, the smaller the area of such upheaval, the greater at the same time this upheaval has been in force and effect, the greater will be the volume and richness of the metal within its boundaries. And this (it may seem, as I say, preposterous) I claim for the silver region of the Sierra Mojada, or Wet Mountain, in Fremont County. But two years have passed, and the Rosita mines show returns which astonish the metallurgist. Not yet has the surface scattering of plutonic matter been pierced by the shafts of the Pocahontas and other mines, and already the metal-bearing ore is in the dense volume state. We have not yet arrived at the depth of hermetic closed strata. We have to sink yet 300 to 400 feet to reach the niveau of the secondary strata. How will it look there? We will work and soon show. Let the outward world wait and see."

Further along, Mr. WULSTEN takes up the subject of geology generally, following "HUMBOLDT, LEONHARDT, MARTIN (MARTIN was COMSTOCK's great antagonist; his work on geology is exceedingly scarce), REGNAULT, VOGT, AGASSIZ, and others. We have not space to quote his tremendous description of the processes by which the globe, including Hardscrabble, arrived at its present condition. Suffice it to say that at a certain stage the earth was a smooth kernel, surrounded by mud, muck, and fluid matter, or water; that "the accumulation of nitrogen, hydrogen, and explosive mineral gases" in the interior of this kernel necessitated the expansion of the crust, and upheavals created fissures, by a force which, "working perpendicularly and horizontally, produced an effect in the diagonal," and "lent momentum to the fluid molten metallic matter," which, "following the advancing gas force," filled up the fissures. If anybody wonders that the fluid matter *followed* the gas-force, instead of being driven by it, he should remember that its momentum was only lent, and this was the only way to give it back. In more modern geologic periods, it is not customary to chase creditors in that way. A palæozoic debtor in process of liquidation evidently had a sort of solvency about him. But to drop the figure and return to the fact, we read in the next sentence that the force was "hyperbolic" "parabolic," and, above all, "*gasioic*." Who wouldn't follow such a force as that? We certainly would, even as the small boy follows a brass band.

Still further on, we find a chapter on *Oryktognosy*, which is a learned synonym for mineralogy. Certainly the ordinary term would scarcely serve to characterize Mr. WULSTEN's classification of pyrites, galena, the sulphurets of copper and of silver, to say nothing of the chloride and the bromide of the latter, as "oxidized metals." Oryktognostically speaking, it also appears that heavy spar is a "calcareous earth," and "isinglass" an "oxidized metal," while "glimmer" is a "clay earth," and of "earths" pure and simple there are only three in Hardscrabble, the first being quartz, the second, flint, and the third, "mountain crystals." Oxide of silver is reported as one of the mineral species of this favored district.

Of course Mr. WULSTEN proceeds to instruct the business public as to the profits of gold and silver mining, and the causes of disaster that frequently overtake the business. Into that branch of the fissure we cannot follow him; he is neither "hyperbolic" nor "gasioic" enough to attract us. In fact he relapses into an average dead level of respectable common sense, like a sedimentary deposit, as it were, broken through at occasional intervals only by outbursts of porphyritic splendor.

We have quoted enough to show that although the varied information on other topics contained in this book is not without value, its descriptions of rocks and minerals, formations and veins, are totally worthless. Its avowed object is to attract capitalists to the new silver region. The Bank of Rosita, under the auspices of which it was published, would do well to omit the philosophy, science, and rhetoric from the next edition. As for the facts and prophecies, Mr. WULSTEN has uttered two sentences which are more forcible than all the rest, viz., "We will work and soon show. Let the outward world wait and see." As a part of the outward world, we are waiting. But we confess that if our impressions of Hardscrabble, derived from other sources, had not been decidedly favorable, Mr. WULSTEN's account of its excessively volcanic character, and the nature of its ore-deposits, would have set us very much against it.

*

## MINERAL STATISTICS OF NOVA SCOTIA.

FROM the annual report of HENRY S. POOLE, Esq., Inspector of Mines, we extract the following information regarding the mineral production of Nova Scotia during the last year.

The report is characterized by the care, accuracy, and good judgment, which we have had occasion to note in Mr. POOLE's former productions, and it contains many useful suggestions and much information of a practical character, which will undoubtedly bring forth fruit in the better management of the Provincial mines. The slightly despondent tone, which seems somewhat characteristic of Mr. POOLE, has been heightened by the very unsatisfactory results of the year's mining business. The great depression in business, in this and other countries has affected the Nova Scotia coal trade very seriously, and the output of coal has diminished in consequence. For some reason,

which we have never seen satisfactorily explained, the cost of mining in this field, which may be put down at $1.60 and $1.75, gold, is considerably greater than in many of our American mines working veins at least as small and under conditions, apparently, no more favorable, while the fact, pretty well established, that the Nova Scotia coals are inferior in quality to our best American varieties, makes their selling price in our markets very low, so low in fact that at present there would be little profit in sending us these coals even were they admitted free of duty, and with an entry charge of 75 cents per ton, there is very little prospect indeed of relief in this direction for our neighbors from the depression which has borne so heavily on them during the past year.

The following table gives the quantities and values of the several minerals produced during the past three years :

COMPARATIVE GENERAL STATEMENT.

| Mines 1875. | Minerals. | Quantities. | | | Values in Dollars. | | |
|---|---|---|---|---|---|---|---|
| | | 1873 | 1874 | 1875 | 1873 | 1874 | 1875 |
| 31 | Coal .....tons | 1,051,467 | 872,720 | 781,165 | 2,699,347 | 1,787 098 | 1,434,062 |
| 41 | Gold .....ozs.* | 11,852 | 9,141 | 11,208 | 219,270 | 164,538 | 201,756 |
| 1 | Iron ore ..... tons | 3,485 | 2,469 | 4,467 | 10,455 | 7,407 | 13,401 |
| | Plaster..... " | 120,693 | 104,140 | 95,159 | 120,693 | 104,140 | 95,907 |
| | Freestone, etc... " | 2,820 | 8,829 | 5,778 | 34,532 | 40,313 | 39,639 |
| | Limestone..... " | .... | 448 | 4,860 | ..... | 537 | 3,372 |
| | Molding Sand.... " | 130 | 300 | 100 | 260 | 600 | 200 |
| | Barytes..... " | ..... | 208 | 175 | ..... | 2,680 | 1,750 |

* Unsmelted gold valued at $18 per ounce.

From this we perceive that gold mining alone has improved to a very considerable extent during the year. The output of iron ore and limestone has also increased somewhat, though it is yet quite inconsiderable.

The total value of the mineral productions of Nova Scotia in 1875 were but $1,790,087, or $317,226 less than in 1874, or nearly $1,300,000 less than in 1873.

The disposition of the coal mined into the Dominion from this country and the quantity imported is given in the following tabular statement :

| Year. | So'd at Home. | Sold to other B. N. A. Provinces. | Exported to U. S. | Canada Imported | |
|---|---|---|---|---|---|
| | | | | From United States. | From Great Britain. |
| 1871 | 150,232 tons. | 168,577 tons. | 165,431 tons. | 216,633 tons. | 190,680 tons. |
| 1872 | 199,886 " | 285,433 " | 154,094 " | ..... | 177,904 " |
| 1873 | 215,295 " | 337.983 " | 264,760 " | 428,455 " | 131,338 " |
| 1874 | 214,965 " | 338,754 " | 138,335 " | 671,224 " | 186,753 " |
| 1875 | 212 630 " | 381,711 " | 89,746 " | 512,835 " | ..... |

Of the coal, 89,746 tons, sent to this country, 16,962 tons were to Portland, Me., for the use of the Grand Trunk Railway of Canada, so that in reality we imported but 72,784 tons of Nova Scotia coal last year, while we sent to the Dominion no less than 512,835 tons, or seven times as much as we imported. Of our imports, 48,829 tons were gas coals, New England taking 23,612 tons, while New York took 25,217 tons. Were the import duty removed, no doubt a larger quantity of these coals would be used here, and should the Canadians carry into execution their threat of imposing a like duty on our coals going into Canada, we would probably find it to our interest to have free trade in this article. We have no doubt our most ardent Protectionists would admit the beauty of free trade principles when we would have the best of the bargain, in the proportion of seven to one. There can be neither beauty nor reason in the principle while our neighbors' markets are already free to us, and they pay all the duty.

Our Canadian Cousins have admired, from afar, the beneficial effects of combination in the coal trade, and in September last the representatives of most of the coal companies met and came to an understanding as to the desirability of united action in reducing output, maintaining prices, and in other matters affecting the trade, but this Blue Nose Combination has not, thus far, become a very definite reality or produced any notable improvement in the Provincial coal trade. Mr. POOLE advocates, with very judicious reservations, the organization of an association among the coal mine proprietors, and suggests that such an association might be the means of great improvement in mining and the management of the mines, by having the members read at their meetings papers on practical subjects.

The returns show that there were engaged, in the production of 781,165 tons of coal, during the year 1875 :

| *Underground.* | 1875. | *Surface.* | 1875. | *Construction.* | 1875. |
|---|---|---|---|---|---|
| Cutters ..... | 1,530 | Mechanics..... | 382 | Persons..... | 267 |
| Laborers..... | 352 | Laborers..... | 681 | Days of labor..... | 39,205 |
| Boys..... | 397 | Boys..... | 168 | | |
| Total days of labor | 453,837 | Total days of labor | 306,841 | | |

Grand total of 3,777 persons employed, and days of labor..... 799,883

Average number of days per person underground..... 194
" " " " on surface..... 249
Average number of tons per cutter..... 510
" " " per day per cutter..... 3·2
Average quantity raised per day per pit..... 191 tons.
Pits worked, days..... 136

The colliery consumption of coal as compared with the total output, was necessarily very large, owing to the small amount of coal raised (781,165 tons). For engines it was 83,534 tons, or nearly 10¾ per cent. for workmen, 40,576 tons, or nearly 5¼ per cent. of the total output.

*Accidents.*—There were but three accidents, which resulted in the deaths of four persons in the Nova Scotia mines, during the past year. Two of these deaths occurred in the gold mines, and two on the surface at the coal mines. There was, consequently, one life lost for every 390,582 tons raised, and for every 1,888 persons employed. Several persons were injured by explosions, falls of roof and other causes, during the year.

*Gold Statistics.*—On page 227 of the current Volume, we published a tabular statement of the production of gold for the year 1875, but it varies a little from the official report of Mr. POOLE, which we annex :

GOLD PRODUCTION OF NOVA SCOTIA.

| YEAR. | Total ounces of Gold extracted. | Quartz Crushed. | Yield per Ton of 2,000 lb. | Total days Labor. | Average earnings per man per day and year, at 300 working days, and $18 per oz. |
|---|---|---|---|---|---|
| | Oz. Dwt. Gr. | Tons. | Oz. Dwt. Gr. | | A day. A year. |
| 1862.. | 7,275 | 6,473 | 1 2 11 | 156,000 | $0 83 $249 |
| 1863.. | 14,001 14 17 | 17,002 | 16 11 | 273,624 | 92 276 |
| 1864.. | 20,022 18 13 | 21,434 | 18 16 | 252,720 | 1 42 426 |
| 1865.. | 25,454 4 8 | 24,423 | 1 0 20 | 212,966 | 2 15 645 |
| 1866.. | 25,204 13 2 | 32,161 | 15 2 | 211,796 | 2 14 642 |
| 1867.. | 27,314 11 11 | 31,386 | 17 9 | 218,894 | 2 24 672 |
| 1868.. | 20,541 6 10 | 32,262 | 12 17 | 241,462 | 1 53 459 |
| 1869.. | 17,868 0 19 | 35·147 | 10 4 | 210,938 | 1 52 456 |
| 1870.. | 19.866 5 5 | 30,829 | 12 21 | 173,580 | 2 05 615 |
| 1871.. | 19,227 7 4 | 30,791 | 12 11 | 162,994 | 2 12 636 |
| 1872.. | 13,094 17 6 | 17,093 | 15 7 | 112 476 | 2 09 627 |
| 1873.. | 11,852 7 19 | 17.708 | 13 9 | 93 470 | 2 28 684 |
| 1874.. | 9,140 13 9 | 13,844 | 13 5 | 77,246 | 2 12 636 |
| 1875.. | 11,208 14 19 | 14,810 | 15 4 | 91,698 | 2 20 660 |
| Total. | 242 072 14 22 | 325,363 | Av'rage.14 21 | 2,489,964 | $1 75 $525 |

## NEW PUBLICATIONS.

THE COAL MINES. By ANDREW ROY, State Inspector of Mines of Ohio.

THIS very readable book of 367 pages has for some time waited for a notice. It is written in a chatty, easy, and yet concise manner, contains much interesting and some valuable information, and, if we mistake not, will be widely read by miners everywhere. It is sufficiently sensational in the description of remarkable mine accidents, and miners' escapes, to keep up the interest, and, at the same time, it administers information in discreet proportion with the sensation.

Mr. ROY, to whom we are indebted for the full and accurate statistics of the Ohio coal trade, is not very fortunate in his anthracite statistics, when he quotes the grossly incorrect reports of the Pottsville *Miners' Journal;* and in some other cases, when he takes his statistics from second-hand sources, he is also led into errors, more or less serious. We also note some serious typographical errors in extracts (on page 15) from BISCHOFF's "Chemical Geology." Mr. ROY describes in general with accuracy, our coal fields, but we note an exception in the case of Alabama, where we are told that all the coal fields are disposed in long, narrow, *trough-shaped basins*, and again, that the Coosa basin is an extension of the Cahaba. In reality, the Cahaba, in the more important portion of the field, is a monoclinal basin, the measures being abruptly cut off by a fault on the south and east, and the Coosa has no connection whatever with the Cahaba field. Also, the Cahaba coal, which Mr. ROY gives as semi-bituminous, is nearly everywhere a good coking coal, and in some of the veins is even well adapted to gas making. We would also differ with Mr. ROY where he says, "the aggregate thickness of workable coal in the anthracite regions of Pennsylvania is *two hundred feet;*" and that "in the Kanawha region, there is an aggregate thickness of seventy eight feet of coal in sixteen seams, the thinnest of which is two-and-a-half feet." We think if each of these figures was divided by three, the result would be more nearly correct. These, and other trifling inaccuracies, do not, however, prevent us from recommending the book as one which will repay careful perusal, and which will doubtless effect a good purpose by giving information to a class that cannot be interested by the more elaborate treatises on mining.

## REPORTS ON PUMPING ENGINES.

WHILE we think our remarks referred to by Mr. WORTHINGTON are of so general application as to justify them, we certainly do not intend them to cover every case, and among the most notable exceptions are the reports on Mr. WORTHINGTON's pumps. Our pages bear ample testimony to the fairness with which these have been made.

TO THE EDITOR—SIR : The interesting and instructive analysis of Mr. SLADE's Report on the Trenton Pumping Engine, published in your JOURNAL, contains one statement which I desire, with your permission, to controvert. The writer says :

"It is scarcely too much to say that it is the only report made on any large pumping engine, since the time of the first Brooklyn engine, which has not had its usefulness impaired by a system of arbitrary allowances to overcome imaginary resistances."

As opposed to this, I assert that not only one, but all, the public trials made of my engines have been computed upon *actual resistances*, increased by no false nor even doubtful allowances. I have suffered enough from comparisons with results obtained on the terms so strongly characterized by your correspondent to give me the right to protest against any further reduction of the reputation of my engine by even a suggestion that it was obtained through doubtful means. Respectfully, HENRY R. WORTHINGTON.

## A PROPOSED REMEDY FOR BLAST FURNACE SCRAPES.

Written for the Engineering and Mining Journal.

Blast furnace managers well know that there is no royal cure for scaffolds, but from the frequency with which they give the recipe "Crack on all the blast you can and give her more heat," it would seem that some of them regard this method as almost a universal specific (if nature and the English language admit of such a thing). But that it is not a cure in all cases is, of course, acknowledged. Standing by a furnace, suffering from internal disorders that wind would not relieve, it struck me that there was a remedy which, though not free from difficulty, is still much easier than the labor and much cheaper than the cost of a week's fight with a furnace.

The furnace, which was of large pattern and used anthracite fuel, had been running on a normal quantity of gray pig, for several weeks when, within two or three days, her make crept up fifteen or twenty per cent. the product, still remaining gray and of fine appearance. Suddenly the entire cast was white iron and the furnace was in a very bad way. Fires were made in the blast ovens, the blast was kept on until the tuyeres closed, which all on one side did. Then the whole blast, was driven through those on the other side until they closed up, which occurred just as the first set opened again. This was repeated until after a week's exhausting labor the furnace gradually worked free.

I suppose this mishap began at the top of the furnace where the reducing gas failed to act for some reason, allowed some raw, or partially reduced, ore to come down. If the oxygen remaining in this ore was not separated from it until it reached the boshes or the crucible, it must have formed carbonic acid with the carbonic oxide which forms the gas proper to that part of the stack. The former which, at a high temperature, is a highly oxidizing agent would burn away the carbon from the mass of fuel and reduced iron which probably hangs on the boshes of every furnace, while in blast, and thus liberate the iron it contained. This would give a production in excess of the daily average and such is perhaps the history of the first evidences of trouble in the case spoken of—the addition of fifteen per cent. to the normal run. This continued, so long as there was any of this material left on the boshes. When that failed there was no fuel to neutralize the oxygen which had got into the crucible by unfair means, and the carbon which should have entered the iron was burnt, reducing the grade at once. Even this did not suffice to neutralize the free oxygen and the unreduced ore was melted as such, or re-oxidation of the sponge iron took place. Either hypothesis explains the production of scouring cinder which quickly reduced the walls of the hearth to a shell. The pasty cinder which had to be drawn out through the tuyere holes may be accounted for by the excess of base, due to the iron oxide, or to the presence of uncarburetted iron sponge in the cinder. The latter would be merely one step beyond white iron, in the process of degrading the quality of the pig.

In such cases, it is generally considered that the furnace needs heat, and this is the only remedy that is applied, so far as the bottom of the stack is concerned. But heat can do no more than keep the scaffold soft enough to allow it to be drawn out. Correct the cause of the trouble it cannot. Nothing but *carbon* can do that and the benefit derived from carbon does not depend upon its heat-giving powers, but merely upon its restoring fluidity to the iron, by forming a carbide, giving chemical equilibrium to the furnace. Heat, of course, results, too, and is valuable, but it is as a chemical agent that the "exhibition" (as the doctors say) of carbon is demanded. When furnaces were small this was done by pulling out part of the scaffold and replacing it with coal, but since large furnaces have been employed the use of coal has grown infrequent and blast heat has been more generally relied upon.

This, however, cannot possibly take the place of the carbon, and the control and cure of scaffolds now probably depends upon finding some way of introducing carbon which is suited to modern apparatus. There appears to be but one method for doing this, to blow it in through the tuyeres.

For this purpose slack from any kind of coal sifted to about ¼ inch maximum size would answer and the best mode of introduction seems to be by ½-inch pipes thrust through the poker holes. This method requires a separate air blower, and a system of pipes and hoppers for introducing the slack, making an apparatus that, perhaps, would not be altogether comfortable to have about the furnace and easy to work. But if it corrected the evil no difficulties in its management could possibly equal the exhausting labor of a prolonged "scrape." Calculation will show how much coal and air are necessary.

A ton of pig containing 94 Fe. and 3 Si. corresponds to a hematite ore containing 0·387 tons of reducible oxygen. If the 3 per cent. of carbon which the pig would normally contain is burnt by the excess of oxygen, its combustion shows that at least 4 per cent. of the oxygen has escaped reduction in the upper part of the furnace. As the scrape went very much further than this, in the case mentioned, 10 per cent. of oxygen, or 0·039 ton per ton of pig, may be assumed to have reached the boshes. To consume it 7½ per cent., or about 0·029 tons of carbon are needed, this corresponds to 65 pounds of carbon, or 80 pounds of anthracite. Adding one-third to supply heat for the expulsion of volatile matter, carbon reduction, fusion of ash, etc., of this extra anthracite, we have 107 pounds of slack required for this purpose. The failure of the gases to reduce the ore also throws upon the fuel in the crucible the work of supplying about 40 heat units per ton requiring 36 lb. carbon, or 45 lb. anthracite. Therefore, if the remedy is applied early, before the stock has cooled down, the addition of 150 lb. of anthracite per ton of pig made should theoretically be sufficient to correct the chemical disorders which have commenced, and for 40 tons make a day this would require 6,000 pounds of slack in 24 hours or 250 lb. per hour.

To introduce this, or double this quantity of slack, would not require more than 100 cubic feet of air per minute, at a pressure, perhaps slightly above that of the blast. Any small air pump, such as those used for agitating petroleum, would supply it. In regard to the feasibility of doing this, it is to be remembered, that *powdering* the fuel would be unnecessary, as instantaneous combustion is not desired. There would be no wear of the walls as in air furnaces because the coal would be blown into a solid mass of "stock."

As to the difficulties, a system of small pipes, with a hopper over each one and a man stationed at each hopper—this is certainly not the ideal of a furnace manager. But it would give less trouble than the present mode of dealing with scrapes. It restores the old method, and the only true corrective, for scaffolds, which result from descent of unreduced ore to the crucible. Heat cannot possibly cure them and carbon must be added in some way if the tremendous labor of fighting a long scrape is to be avoided. With an apparatus like this at hand the manager would be able to begin an effective fight against the scrape at the earliest moment, and we should probably see the most frequent class of scaffolds provided for and prevented. J. A. C.

[Would not the introduction of gaseous hydrocarbons effect the desired purpose, and be of easier application?]—Ed. E. & M. J.

## THE FLUCTUATIONS IN THE PRICE OF GOLD SINCE 1862.

The following table shows the highest and lowest monthly prices of gold, as measured by paper currency, since January, 1862, the date of the suspension of specie payments. In making comparisons of values, it is usually necessary to bring them to a gold basis. This table, which affords the necessary data, will be of permanent value for reference :

| Date | 1862. Low. | 1862. High. | 1863. Low. | 1863. High. | 1864. Low. | 1864. High. | 1865. Low. | 1865. High. | 1866. Low. | 1866. High. | 1867. Low. | 1867. High. | 1868. Low. | 1868. High. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan. | par. | 103⅝ | 133⅜ | 160¼ | 151¼ | 159⅜ | 197¼ | 234⅜ | 136¾ | 144⅝ | 132 | 137⅞ | 133¼ | 142¼ |
| Feb. | 102⅛ | 104¾ | 152⅛ | 172¼ | 157⅛ | 161 | 196⅜ | 216¾ | 135⅞ | 140⅝ | 135¼ | 140¼ | 139¾ | 144 |
| M'h. | 101⅛ | 102⅛ | 139 | 171¾ | 159 | 169⅜ | 148⅛ | 201 | 125 | 136⅛ | 133⅜ | 140⅜ | 137⅞ | 141¼ |
| Apl. | 101⅛ | 102⅜ | 145⅛ | 157⅞ | 166¼ | 184¾ | 143⅛ | 154¼ | 125 | 129⅛ | 132⅞ | 141⅞ | 137⅜ | 140⅜ |
| May | 102⅛ | 104⅛ | 143⅛ | 154¾ | 168 | 190 | 128¼ | 145¼ | 125⅛ | 141⅛ | 134⅞ | 138⅞ | 139⅛ | 140⅛ |
| Jun. | 103⅜ | 109½ | 140⅛ | 148⅜ | 188¼ | 250 | 135¼ | 147⅜ | 137⅜ | 167¾ | 136⅜ | 138⅜ | 139⅜ | 141¾ |
| July | 108⅜ | 120⅛ | 123¼ | 145 | 222 | 285 | 138⅜ | 146⅛ | 147 | 155⅝ | 136⅜ | 140¾ | 140⅛ | 145¼ |
| Aug | 112½ | 116¼ | 122⅛ | 129¾ | 231⅛ | 261¾ | 140¼ | 145⅛ | 146⅛ | 152¼ | 138 | 142⅜ | 143¾ | 150 |
| Sep. | 116⅛ | 124 | 126⅜ | 143¼ | 191 | 254½ | 142⅜ | 145 | 143¾ | 147⅛ | 141 | 146⅜ | 141⅛ | 145⅛ |
| Oct. | 122 | 133½ | 140⅜ | 156¾ | 189 | 227¾ | 144⅛ | 149 | 145⅜ | 154⅜ | 140¼ | 145⅝ | 133¾ | 140⅛ |
| Nov. | 129 | 133¼ | 143 | 154 | 210 | 260 | 145¼ | 148¾ | 137½ | 148⅝ | 138¼ | 141½ | 132 | 137 |
| Dec. | 128⅛ | 134 | 148⅛ | 152¾ | 212¾ | 243 | 144¼ | 148½ | 131¼ | 141¾ | 133 | 137⅞ | 134⅜ | 136¾ |

| Date | 1869. Low. | 1869. High. | 1870. Low. | 1870. High. | 1871. Low. | 1871. High. | 1872. Low. | 1872. High. | 1873. Low. | 1873. High. | 1874. Low. | 1874. High. | 1875. Low. | 1875. High. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan. | 134⅝ | 136¾ | 119⅜ | 123¼ | 110½ | 111¼ | 108½ | 110⅛ | 111⅝ | 114½ | 110⅛ | 112⅛ | 111¾ | 113⅝ |
| Feb. | 130⅞ | 136¼ | 115 | 121½ | 110¾ | 112¼ | 109⅛ | 111 | 112⅞ | 115⅛ | 111⅜ | 113 | 113¼ | 115⅜ |
| M'h | 130¼ | 132½ | 110¼ | 116⅜ | 110⅛ | 111⅝ | 109¾ | 110½ | 114⅝ | 118½ | 111¼ | 113⅝ | 114⅛ | 117 |
| Apl. | 131¼ | 134¾ | 111⅛ | 115⅝ | 110⅛ | 111¾ | 109⅞ | 113¼ | 116¾ | 119⅛ | 111¾ | 114⅜ | 114 | 115½ |
| May | 134⅝ | 144¾ | 113¾ | 115¼ | 111 | 112¼ | 112⅛ | 114⅜ | 116⅝ | 118⅝ | 111⅞ | 113¼ | 115 | 116⅜ |
| Jun. | 136¼ | 139⅝ | 110⅞ | 114¾ | 111¾ | 113⅛ | 113 | 114¾ | 115 | 118¼ | 110⅛ | 112¼ | 116¼ | 117½ |
| July | 134 | 137⅜ | 111¼ | 122¾ | 111¾ | 113⅝ | 113⅜ | 115¼ | 115 | 116⅜ | 109 | 110⅞ | 113¾ | 117⅛ |
| Aug | 131¼ | 136⅝ | 114¾ | 122 | 111⅝ | 113¼ | 112½ | 115⅝ | 114¾ | 116¼ | 109¼ | 110¼ | 112¾ | 114¾ |
| Sep. | 130¾ | 162½ | 112¾ | 116¾ | 112¾ | 115⅜ | 112¾ | 115⅛ | 114⅜ | 116⅛ | 109¾ | 110¼ | 113¾ | 117¼ |
| Oct. | 128¼ | 132 | 111⅛ | 114¼ | 111½ | 115 | 112¼ | 115⅝ | 107⅝ | 111¼ | 109¾ | 110⅜ | 114⅛ | 117⅝ |
| Nov. | 121⅝ | 128⅜ | 110 | 113⅞ | 110⅜ | 112⅝ | 111⅝ | 114¼ | 106⅛ | 110⅞ | 110 | 112⅜ | 114⅛ | 116⅜ |
| Dec. | 119⅜ | 124 | 110⅜ | 113⅜ | 108⅜ | 110⅜ | 111⅜ | 113½ | 108⅜ | 112⅛ | 110⅛ | 112⅜ | 112⅝ | 115¼ |

| 1876. | Highest. | Lowest. |
|---|---|---|
| January | 113¼ | 112⅝ |
| February | 114⅛ | 112¼ |
| March | 115 | 113¾ |

## THE RICHNESS OF MONTANA MINES.

The *New Northwest* compares Montana mines with the more famous Nevada bonanzas, and the comparison only shows that the "Big Bonanza" is not much of a deposit after all ; in fact, the owner of a Montana claim turns up his nose, metaphorically speaking, when you speak of a mine yielding only $35 to the ton, and would scarcely accept, as a present, a Nevada bonanza.

"Alder Gulch has produced more gold than any other placer of equal extent in the world. The claim that Montana quartz is richer in the noble metals than of any other portion of the American gold and silver bearing regions is true. The extent—the depth, width, and continued richness—of the quartz has yet to be demonstrated. Its leads are almost numberless ; but how many of them will be dug out, or become barren at comparatively trifling depth, remains to be demonstrated. Having been developed only to a limited extent, and showing strong veins, perfect walls, and pay ore, as far as sunk on, it is certainly as fair to assume that they will be as permanent as those of any other section. While no Comstock has as yet been developed, there are many thousands of gold and silver veins sufficiently large to work advantageously, and indicating they are true fissure leads. This is better for the people of the Territory than if many of them were consolidated into one. Now, perhaps, our own miners, even do not realize the advantages they have. Let us note first the yield The silver ores now being taken out and milled from the west side mines, average far higher than those of Nevada, and even of the famous Comstock. We give here the yield of the Comstock ores for the quarter ending December 31, 1875 :

| Mine. | Tons. | Average. | Yield. |
|---|---|---|---|
| Consolidated Virginia | 26,800 | $119 | $3,205,900 |
| Belcher | 30,300 | 32 | 999,800 |
| Crown Point | 29,700 | 17 | 506,000 |
| Ophir | 9,200 | 45 | 419,300 |
| Chollar Potosi | 6,800 | 16 | 119,900 |
| Imperial | 2,700 | 27 | 47,700 |
| Hale & Norcross | 3,000 | 17 | 54,000 |
| Other mines | 17,800 | 8 | 144,800 |
| Totals | 126,300 | $35 | $5,523,700 |

"The other mines of Nevada will not average $12 per ton Yet this is the Bonanza mine. What do Montana miners think of $35 silver ore? Just instance the Philipsburg Trout ores averaging, by milling process, $140 ; the Butte, La Plata and Travona ores averaging $200 ; and with but little more waste and sorting than the Comstock ores, the Hope and many others at Philipsburg will mill $140 per ton, and the Banker, Moulton, Neptune and others at Butte over $100 per ton. Had Montana the miners and facilities for reduction that Nevada has, her product of bullion would be greater this year than the Comstock, for the 45,000 tons of $35 silver ore, or its equivalent in high grade ores, could be taken out every month easily. Then in the character of ores Montana possesses immense advantages for reduction here. The Utah ores are nearly all base—those of Montana nearly all free milling. There they smelt ores down as low as 12 to 15 ounces per ton, and the 40 to 60 per cent. lead, with the lower transportation, is what makes the profit. The Montana ores being free milling, they can be reduced here more economically than they could be shipped abroad by railroad. We believe the Northwest Company reduces its ores at an expense of mining and milling of $16 per ton and saves over 90 per cent. It would hardly pay them to ship to Swansea if they had their ores at tide water. What Montana wants, therefore, and what she is acquiring and will rapidly acquire, through the success of companies now operating, is reduction works. The "professor era" of Montana, corresponding with the "dark ages" of the world, is past. Practical men are doing practical mining, and it pays. The tide has just set, and it will not cease. Last year many good companies got under way, and there will be more and more this and each succeeding year, until Montana attains its proper place as a bullion producting Territory or State, and that will be in the first rank and ahead."

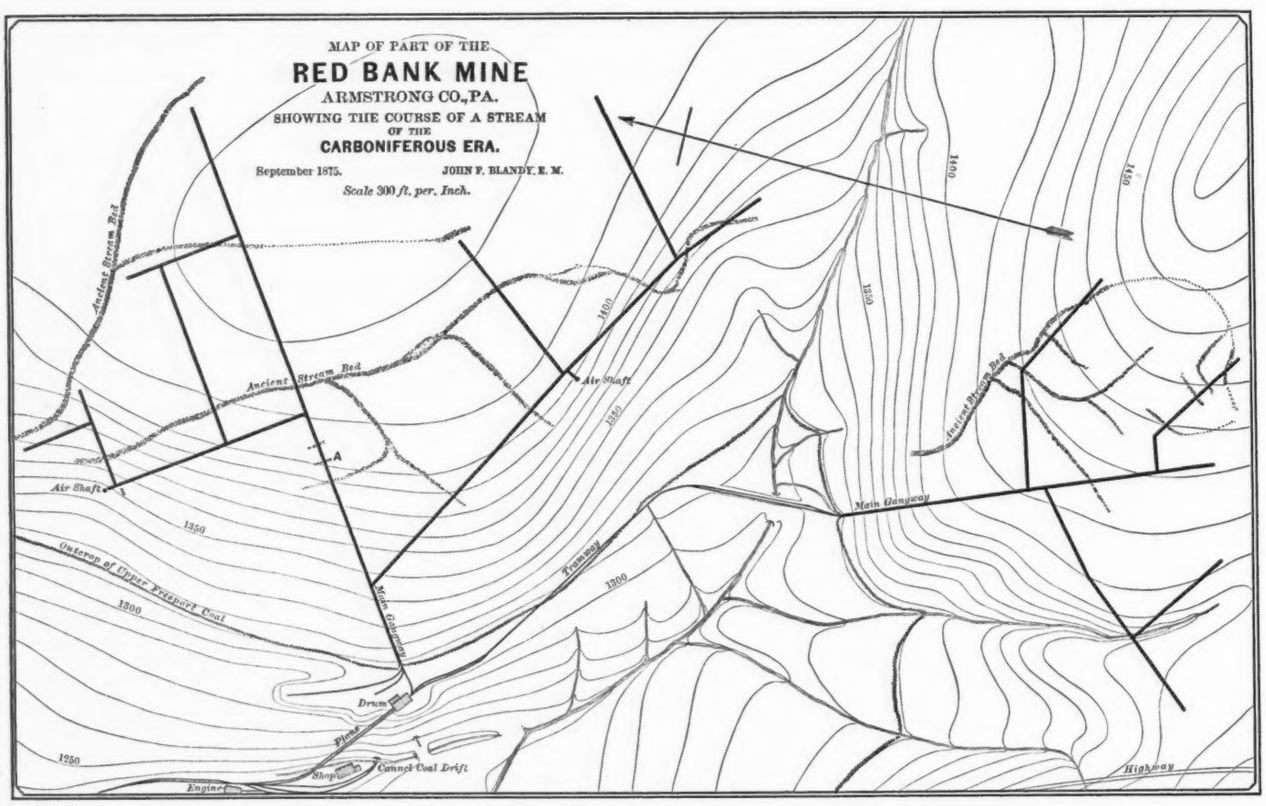
## ON EVIDENCE OF STREAMS DURING THE DEPOSITION OF THE COAL.*

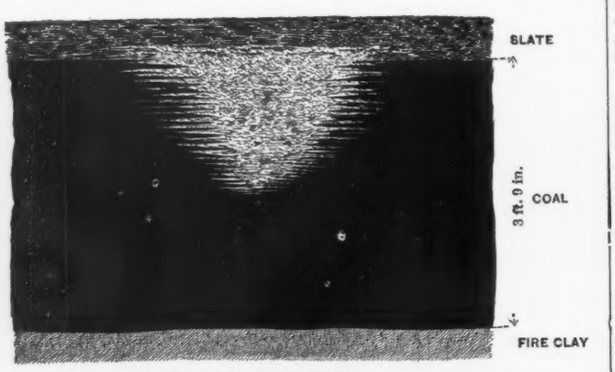
By John P. Blandy, of New Bethlehem, Pa.

THE accompanying map illustrates a part of the works of the Red Bank Mining Company, on the Upper Freeport seam of coal, in Armstrong County, Pennsylvania. The contour lines give a careful representation of the conformation of the surface, showing also the line of outcrop of the seam, and the gangways of the mines are shown by the black lines.

Upon assuming charge of the works in January last, I found that the first and greatest difficulty lay in the great uncertainty of the mine operations, as the rooms were so often being cut out by what the miners termed "horsebacks" —a roll in the roof of what appeared to be an indurated mud. These rolls would sometimes cut down to the floor of the seam, and even with the underlying fire-clay, but most frequently coming down to within a few inches of the floor, leaving a "mining" of impure coal between them and the clay. There seemed to be so much uncertainty as to when and where they would occur, that I determined to map the mine carefully, so as to see whether there was not some regularity to these "horsebacks." On account of sundry places having fallen in, I was not able to map all as completely as I should have wished. The result I here give, and the conclusion came to was, that they followed the line, or rather were the "filling in" of a streamway, which existed at the time of the deposition of the coal, and a more careful examination of the material strengthened me in the opinion.

The map shows two separate mine openings, on opposite sides of a narrow valley. In the one on the north side of the valley, there are what may be called two main streams—the work not having been extended far enough to the north-westward, to show their junction.




Section of the Branch at A.

Upon the area between these two main streams, the coal bed is regular and coal good, but it is only about 2½ feet thick; whether this reduction of about fifteen inches from the average thickness of the seam is due to the coal having been deposited on higher ground, or to an earlier covering with slate material than the other part of the seam, cannot be determined by any measurement. I am inclined to think the former was the case.

On account of the valley between the two mines cutting below the level of the coal bed, no direct connection can be traced between the "horsebacks" of the two mines, but, as in working southward the main stream seems to get smaller, I judge those in the south mine to be branches from that in the north. On account of the frequent interruptions which had been met with no regular plan had, or could be carried out in the mining. The result of my surveys caused me to open out towards the south-west, in order to get away from the "stream," and so far, I have met with no disturbances in that direction.

I might mention here, that I have learned of these same occurrences in several coal-banks of the farmers of the neighborhood, and in some of those of the Colwell Furnace, three miles to the south.

The most interesting point of this subject, is the manner of the filling in of these water courses. I give a cross section of the branch, in the north mine, at the point A, which illustrates more distinctly than any other that I have met with, the characteristics.

The mass of the "horseback" is of indurated mud, reaching about half way down from the roof to the floor—the coal underneath it being regularly bedded. The sides show an interstratification of coal and earthy material—the layers varying in thickness from that of a knife blade to half an inch. Every cross section shows more or less the same features, though in some this interstratification occurs only on the one side, the other side being an abrupt face of coal. The coal within two or three feet of the "horseback" is always tender and small fractured, but pure. The indurated mass at the top gradually passes into slate, showing that the stream continued to exist for a short time after the slate began to form. As we approach the ends of the branches, they gradually rise, disappearing in the roof of the coal bed. Upon an examination of the ends of these branches, I have formed the opinion, that the earthy material has been brought up the stream by a tide, and not downward by a current. This, together with the fact that the branches are short and tortuous, shows the flat, low position of the land upon which the coal-bed was formed.

I have been particular in illustrating a cross section, as it points to a method of deposition of the coal, not to be explained by any theory of the formation of coal-beds, which I have yet met with, and further, because by the collection of such facts, we may arrive at better conclusions.

The interstratification of the coal and earthy material on the banks of the stream, points to a much more rapid deposition of coal than is generally admitted, and also to its having been in a very fine-grained or semi-fluid state. Furthermore, if the stream was silted up by the action of a tide, then it was formed above water, and not entirely under water, as some theorists have contended. I do not pretend to form any theory myself on the subject, but bring these facts forward more as negative evidence to those which have heretofore been advanced.

In conclusion, I would state, that whilst in the anthracite district, I had the misfortune to have charge of mines that were much troubled with what were called "dirt faults." From a careful study of them, I formed the opinion, that they were the water courses of the era, the material with which they were filled or silted up, being such a mixture of earth and powdered coal, as

* A paper read before the American Institute of Mining Engineers, at the Cleveland Meeting, October, 1875.

not to admit of a solidification of the mass. I am now still more convinced of the correctness of the idea.

However interesting these "streams" may be to the geologist, I must say, that to a miner, they are anything but desirable.

DISCUSSION.

Dr. R. W. RAYMOND said, that he felt deeply indebted to Mr. BLANDY, for the presentation of his interesting and suggestive paper. No doubt, similar careful work would correct and explain the irregularities of this character in many coal basins, to the great benefit of owners and engineers. He was not prepared, however, on first hearing of the evidence submitted in this paper, to admit that the facts of structure and stratification set forth, were inexplicable upon accepted hypotheses of the formation of the coal deposits, though perhaps this feeling was due to the brevity of Mr. BLANDY'S discussion of this point.

## CONCERNING TECHNICAL REPORTS.

A TECHNICAL report may be defined as a statement of facts relative to some discovery or achievement in Science or Art. Its purpose is the instruction of all interested in the subject; to accomplish which, it must be accurate and full, and at the same time, terse and pertinent. It must comply with the legal requirement respecting evidence; being not only "the truth," but "the whole truth" and "nothing but the truth."

Such then being the character of a scientific report, shortcoming from this standard can only result from ignorance or disingenuousness; and it is the experience of all having to deal with statements of this class that, before attaching value to them, each separate assertion must be tested with reference to these two sources of error. Ignorance betrays itself through the paradoxes in which shallowness delights, through the self-contradictions and *non-sequiturs* to which resort must be had, in order to arrive at the desired conclusion; and is so palpable as to require no pointing out. Not so disingenuousness—it infects every sentence, it assumes a thousand shapes, and like

"The lie that is half a truth is the hardest thing to fight."

The domain of the Arts, or of applied Science more particularly, affords the widest field for specious statement. A process in pure mathematics is its own voucher, but a thesis in Engineering—the knowledge of which is of necessity to a certain extent empirical—has no claim to credence unless fortified at all points by experimental proof. Literature of the kind in question is commonly published for one of two purposes, viz., to augment the fund of human knowledge, or, as a special plea, and, before ascribing weight to the submitted testimony, it is essential that it be clearly understood in which category it comes. One of the subtlest analysts of human motives in modern times says, "Where personal interests come into play, there must be, even in men intending to be truthful, a great readiness to see facts which it is convenient to see, and such reluctance to see opposite facts as will prevent much activity in seeking for them," and in view of this there must be no misapprehension of the object which a statement is to subserve. Combined with this obstacle—having its origin in the very springs of human action—to the obtaining of the whole truth, each specialty presents others peculiar to itself, and no branch of technics has more to contend with in this respect than Engineering. Its scope is so rapidly increasing; the wisdom of yesterday is so often the foolishness of to-day; discovery and application so crowd upon the brain, giving no time to name, define, or tabulate, the elements of the science, that a loose indeterminate, confused nomenclature has come into use, which too well serves the purpose of those who write "*ad captandum vulgus.*" No knowledge can be imparted unless informant and recipient have the same conception of the terms employed; discussion under other conditions is waste of breath, and there are too many lines of retreat from it open to a worsted disputant not to conduce to an active or passive maintenance of this status, by such as darken counsel by words without understanding.

Singularly enough, the style that took its rise in the vague and diverse nomenclature of an inchoate technism is retained through mere force of habit by some unimpeachable investigators of the present day, attaching to their professional utterances just that faint shadow of distrust which an unworthy garb and uncertain presence do to the individual. To know the author is to forget the questionable aspect of the statement, but this is not always possible; and even were it so, a scientific essay should be its own credential—its acceptance or rejection, self-determined.

Among reports of mechanical performance, examples of special pleading most frequently occur, and this may be explained as follows:

The structures whose achievements are recorded, are generally such as minister largely to human necessities, and for which a rapidly spreading civilization is causing an increasing demand. They are often works of magnitude involving a large outlay, and the inventor who effects most for the cost, drives all rivals from the field. This multiplies contestants, who, beside the incentive of gain, are prompted by the instinct of paternity, making them Argus-eyed to the merits, but blind to the faults of their mental offspring. If, then, this branch of engineering literature exhibits the greatest number of special pleas; if the nomenclature of the profession offers peculiar facilities to pretenders—if, in addition to personal interest the sentiment of fatherhood is called into play—it is unquestionable that reports of mechanical performance demand beyond all others a rigorous analysis before credence can be yielded to them. The impression left upon the mind after a first perusal of a report will, when the reader is versed in such matters, generally be a fair verdict; but as prepossession may so largely affect this, and interior conviction is inadmissible in argument, it becomes necessary to postulate the modes by which a specious report endeavors to obtain confidence, and the following classification probably comprehends all.

I. Irrelevant statement.
II. Indirect method.
III. Incomplete statement.
IV. Finical precision.
V. Arbitrary corrections and allowances.
VI. Unwarrantable generalization.

These heads hardly require explanation, but it is not out of place to advert to each separately, and to point out the reason that each is resorted to. The first and fourth are to confuse the non-professional reader, and dismay him with the vastness of the subject; the second is to compel indorsement from professional confrères who have not time to follow out the intricacies of an unusual method, but shrink from admitting their lack of familiarity with it. It goes hand in hand with the third head. The fifth is aimed at everybody, and for the reason that no one can oppose it except by flat contradiction, which is not argument. The sixth consists in assuming the results of meager observations maintained through brief periods to be the measure of general efficiency, and is essayed with professional and non-professional alike.

Example is better than precept, and scarcely a report of mechanical performance issues from the press that may not be used, as did the Spartan father his drunken Helot.

The recent masterly criticism upon the Lynn Engine Duty Trial, contributed to your paper* by THERON SKEEL, Esq., not only stimulates these remarks, but suggests the best subject to be taken in illustration.

From the first, I have wondered that a trial of such importance, attested by so many good names, should be allowed to come and go unchallenged, when to every eye it abounded in departures from precedent and standard practice.

The reading of Engineer SKEEL'S bold and decisive impeachment of its conclusions has given me a pleasure which I partly express in this amplification of his train of thought.

Taking up the report of the trial seriatim, the first passage that prompts misgiving states: "To supply air to the air-chamber there is a small air-cock on the lower valve chamber. The air drawn in through this cock on the up stroke of the pump somewhat reduces the quantity of water discharged by the pump. Careful experiments previous to, and in the early part of the test, established the effect of this cock by measurements at the weir and a uniform opening of this cock was kept during forty-eight hours of the trial; during the other four hours the average loss of action was a trifle less than during the forty-eight hours; during one hour the cock was completely closed." The questions that force themselves upon the attention are: First—What can be the object in employing a device that confessedly "reduces the quantity of water discharged," and which other pumping engines dispense with? Second—Can the effect of this cock be relied on as established "by measurements at the weir," which are themselves demonstrably variable? Third—For what reason and in which four of the fifty-two hours of trial was "the uniform opening" of the cock reduced and finally closed? If smooth working was obtained only by an expedient which partially crippled the pump it would argue faulty design; if the familiar "indicator" had been applied to the pump barrel there could have been no question as to the quantity of water discharged from it at each stroke. In this case a careless expression of facts—which no doubt were satisfactorily dealt with—renders the report fairly chargeable with incomplete statement and indirect method. Passing on, the next point that excites remark is the long table of dimensions, which, though appropriate to a discussion of rival compound engines, is not clearly pertinent to a report upon machinery whose sole function is pumping. The data respecting the force main should be excepted from the charge of irrelevant statement which might be urged against all the rest in the table. Farther along occurs the assertion that it was not "considered necessary to publish the records of the engine-room in full," which seems the more singular in view of the care and nicety of measurement lavished upon the supplying of water and coal to the boiler.

From the incompleteness of statement here admitted one must needs tax the report with finical precision on these latter points. Again, the practice of allowing the contractor "to cull or pick the coal," and of denying him any allowance "for cinder or unconsumed coal" is as much too loose and inexact as the firing by ordinates and abscissas is too dilettante. The error might be either for or against the engine, and such carelessness is unpardonable in a report which assumes to record the duty of a machine in the conventional units of work.

The most remarkable paragraph in the report is the one commencing "The engine has no pump connected directly with it," and it exhibits so marked a case of incomplete statement that an uncharitable critic would declare the omissions purposely made to mislead. Until it be known whether the coal burned in the independent boiler, which so badly furnished steam for the donkey pump, was included in the total amount consumed in the trial, it is futile to ponder on the question whether or not the abstraction, in eight hours, of sufficient steam from the main boilers to run a donkey pump, "connected as at Lowell," for fifty-two hours, has any bearing whatever upon the experiment. It would have been more satisfactory had the process of measuring the weir discharge been given, step by step, and the measurements continued throughout the trial. The co-efficient of contraction is so largely influenced by the form and degree of finish of the weir, and the measurement of "head" so modified by the distance from the weir at which it is taken—thus secondarily affecting the co-efficient of contraction—that the reader, if at all judicial, cannot yield to the results the credence that he might, did he know how they were obtained. The name of FRANCIS lends authority to any method that he prescribes; yet eminent hydraulicians enunciate formulæ, which give materially different results. Let us apply one of them to the case. Assuming that the "two racks covered with wire cloth.....to insure that the water should approach the weir with as uniform flow as possible"—served their purpose well enough to preclude correction for "velocity of approach." We obtain from the following formulæ, given by RANKIN upon the authority of PRONY and NEVILLE, viz.:

$$Q = \frac{2c}{3} . b\, h \sqrt{2\, g\, h} \text{ (I) and } c = 0{\cdot}57 + \frac{.b}{10B} \text{ (II.)}$$

in which $Q$ = cubic feet per second discharged through weir.
$c$ = co-efficient of contraction.
$b$ = breadth of weir in feet = 3·73.
†$h$ = "head" in feet = 0·741.
$B$ = width of channel leading close to weir in feet = 6.
$g$ = acceleration of gravity = 32·2.

the following results. Substitute our given values in formula II. and we have

$$c = 06{\cdot}33.$$

which, introduced into formula I. and the other substitutions made, gives

$$Q = 8{\cdot}052.$$

This result exceeds the stated discharge (7·636 mean) by 0·416 cubic feet per second, and modifying it with reference to "velocity of approach" should only increase the discrepancy; yet it would be worth while to apply the correction if data could be found for it; but the speed of the current is not given nor any description of the micrometry employed to determine the heads specified, and it is impossible to verify the results. Indirectly this correction may be estimated from figures found in various paragraphs of the report. For example, in the ap-

* ENGINEERING AND MINING JOURNAL, March 11, 1876.

† The report only gives the mean discharge during the time the measurements of "head" were made; but the "head" to which this discharge is due ought to be readily calculated by comparing it with any other discharge through the same weir with a given "head"—since "heads" are proportional to squares of respective discharges—but for some unaccountable reason, this law will not apply here, and it is necessary to use the arithmetical mean of the observed "heads," and attribute to it the average discharge.

pendix it is stated that the delivery of water into the reservoir was at the rate of 205,772 gallons per hour, or in cubic feet per hour 27509·626. The width of the weir box was 6 feet, the crest of the weir was 2·118 feet above its bottom, and the measured head 0·741 feet above the crest of the weir, which gives an area of approach of

$$(2{\cdot}118+0{\cdot}741)\ 6 = 17{\cdot}154 \text{ square feet.}$$

In order that 27509·626 cubic feet of water may pass through a conduit of this area in one hour, they must move, in that period, 1603·686 feet, which corresponds to a velocity of 0·4455 feet per second, and is also that due to a "head" of 0·00308 feet.

The formula which NEVILLE applies to this case is

$$Q = 5{\cdot}35\ c\ b \left\{ (h+h_o)^{\frac{3}{2}} - h_o^{\frac{3}{2}} \right\} \qquad \text{(III.)}$$

in which there is no change of the previously given notation, and the "head," to which is due the "velocity of approach," is represented by $h_o$.

Making the necessary substitutions we obtain

$$Q = 8{\cdot}109.$$

The result is still at variance with those recorded, and explanation of it may perhaps be found in the circuitous way by which the data for the formula were reached. The value of Q first obtained being more in consonance with the tenor of the report, has the best claim to acceptance, and might be received were it not for an incongruity which it involves. The total revolutions made by the engine in the fifty-two hours' trial are given in the appendix as 57357 which corresponds to 18·384 per minute, in which time the weir discharge, measured by the generally accepted hydraulic formula, was

$$8{\cdot}052 \times 60 = 483{\cdot}12 \text{ cubic feet.}$$

The capacity of the pump barrel is published as 194·37 gallons—equivalent to 25·985 cubic feet—and in 18·384 revolutions it could only deliver

$$25{\cdot}985 \times 18{\cdot}384 = 477{\cdot}71 \text{ cubic feet,}$$

less than the calculated discharge by 5·41 cubic feet. An error in the observations might have caused the anomaly, but, waiving this explanation, the discrepancy between the formulæ used on this occasion and those commonly employed would afford an opening for a captious reviewer to say that the former had been framed for this special case in order to save the results from the absurdity here pointed out. Another thing to which he might take exception is restricting the delicate and crucial observations of the trial to a little more than one ninth part of its period, and assuming the data thus obtained to be the average for the whole time. This seems especially rash when an earlier paragraph of the report mentions that an air-cock on the receiving valve chamber of the pump was kept at a uniform opening during forty-eight hours of the trial, that for three hours it was differently set, and for one hour closed. If this variation in adjustment should have happened to fall within the six hours in which the data were taken it would throw grave suspicion upon the entire record.

On so trifling a thing does the credibility of a report of this nature hinge that an example will be well introduced at this point. Calculate by formula I. the discharge with the "head" (0·743) given as the average of the first day's observations; then obtain the discharge with the "head" (0·739) given as the average of the second day and compare the two results. They are, respectively, 8·066 and 8·004 cubic feet per second, differing with each other by 0·062. This quantity in fifty-two hours would amount to 11606·4 cubic feet or 86815·87 gallons, nearly, more than eight-tenths of one per cent. (0·0081) of the stated delivery in the same time. If a variation in the "head" of 0·004 feet less than 1-20th of an inch—which is the difference between the two recorded averages, each for only three hours—could increase or diminish the discharge of the pump nearly, one per cent., what might not be surmised of the remaining forty-six hours of the trial, especially when the paucity of data and description leaves one in the dark as to the means employed to determine the depth of a running stream to thousandths of a foot. A prudent writer would not have so laid himself open to invidious comment. It is readily seen in what precedes, that any one, disposed to be critical, might justly tax the conduct and report of the trial with indirect method, incomplete statement, and unwarrantable generalization. Corollary to this last exception is an illustration of the dangers incident to the method of weir measurement, found in the appendix where it is stated, "the delivery was at the rate of 205,772 gallons per hour. The delivery required by the terms of the contract was 200,000 gallons per hour." It has been shown that a reduction of head of one-twentieth of an inch would diminish the delivery one per cent.—a diminution of three per cent. would have brought it below the contract standard. Comment is needless. The remaining vulnerable points are few and demand only passing notice. There is a certain proneness to professional mannerism—if such a stricture be admissible—which is exemplified in the use of such terms as "loss of action of pump, etc." Had the per centum expressing this quantity been characterized as "fraction of pump barrel not filled with water," a juster idea of what it really is, and what its influence upon the pump would have been given. Had the superfluous steam cylinder diagrams been withheld, and others from the water cylinders furnished, the introduction of this element into the calculation might have been dispensed with, and many points elucidated which are now either left to surmise, or veiled by confusing description.

The invention of diagrams suggests a remark upon the method of calculating duty which is done upon an unusual basis. A load is ascribed to the pump which is not entirely exterior to it. Overcoming the pressure indicated by a gauge just beyond the delivery valve and lifting a certain weight of water from its level in the well up to the gauge is the only useful work performed. Resistance encountered by the water passing through a pump depends largely on good or bad design, and is one of the qualities to test which, duty trials are instituted. To include an exterior resistance as part of the load is to say the worst pump does the most useful work. In this light the propriety of allowing 73·41 pounds per square inch for the net weight on the piston—when the water cards referred to in the report, and which must necessarily have recorded every resistance, external and internal, to the piston motion, amounts to only 73·21 pounds per square inch, 0·2 pounds less than the load with which the pump is credited—is very questionable. Faulty gauges and indicators, or a misinterpretation of their readings and diagrams is, no doubt, the cause of this confliction; but nevertheless this method of calculating duty affords an example of how reports may mislead by the use of arbitrary corrections and allowances. It would be hypercritical to pursue the analysis farther. The most cursory reader cannot fail to see the importance of insisting upon a clear, concise, thorough style in all technical discussions and a rigid definition of the terms and phrases employed. It is only the possession of such qualities that separates an engineer's report from a quack's advertisement, and it behooves the profession to see that indifference in this matter do not bring its literature into disrepute. Honesty is to be sought first and all other things will be added. It is hard to plead guilty to a blunder, but frank confession of failure will publish more real information and win greater confidence than the most ingenious extenuation or disclaimer of responsibility. The world distrusts a man who is always right by his own showing—omniscience is abnormal to humanity. An eminent engineer has said, "There is more to be learned from the combined ignorance of the world than from the wisdom of any one man in it," and those who write with a purpose single to increasing our store of solid facts, may find every encouragement to make unreserve and transparency the dominant characteristics of their style. Error is only a negative guide to truth.

T. W. R.

## BESSEMER CONVERTER BOTTOMS.*

By Robert Forsyth, of North Chicago Rolling Mills, Chicago.

IN working the Bessemer process the bottom of the converter has always been a source of trouble and annoyance, and the subject of more experiments, probably, than any other part of the complex mechanism called a Bessemer plant. This will not appear remarkable when the duties this important piece of refractory material has to perform are taken into consideration.

In the first place, by means of the tuyeres, it delivers at a high pressure the air necessary for the conversion of the bath of metal, and has then to resist the intense heat developed (the highest known in metallurgy), the chemical actions thereby induced, and the wash of five or six tons of molten iron tossed about by the violent ebullition which takes place during the process. That the bottom of the converter has some special difficulties to meet may be judged by the fact that the lining of the vessel (composed of substantially the same materials), not only does not wear away, but actually increases in thickness, while the bottom, in close proximity to the lining is entirely destroyed by a comparatively small number of heats, and has generally a very variable endurance.

It is this irregularity of endurance which is the principal annoyance; and although the methods and arrangements for removing old and setting new bottoms, in use in this country, leave nothing to be desired for rapidity and certainty of working, still, a bottom which can be depended upon absolutely for a certain number of heats facilitates the work wonderfully. This ideally perfect bottom is perhaps unattainable, but it is none the less the constant object of the steel makers' search.

The life of a bottom (barring accidents) may be said to range from 5 or 6 up to over 20 heats; but any thing above 8 heats is generally considered satisfactory.

The removable bottom used in the American Bessemer works consists of a cast iron "tuyere box," perforated with holes to receive the tuyeres, and provided with a suitable blast connection and a removable cover allowing access to the tuyeres for repairs. In making up the bottom the tuyeres are first placed in the holes, and around them is rammed the "bottom stuff"—a mixture of refractory materials, chosen especially for their infusible qualities. This mixture is rammed in a moist state and requires drying before the bottom is put on the vessel. In some European works so much importance is attached to careful drying that bottoms are kept in stock, in the ovens, for months ahead, with certainly excellent results, but no better than are attained in this country without this slow and expensive method.

The life of a bottom depends, in about equal proportions, upon the tuyeres and the bottom stuff. Much trouble has been encountered from bad tuyeres in American works, but at present the manufacturers are making a very good article, and that part of the bottom may be said to be generally satisfactory. The bottom stuff should of course be as infusible as possible, but it should also be solid and capable of resisting the wash of the metal as well as the chemical action of oxide of iron at a high temperature. These requirements are best met by a mixture of silicious and aluminous materials, in proper proportions, well rammed about the tuyeres and thoroughly dried. Any tolerably pure quartz rock, ground, will do for the silicious part of the mixture, and the plastic fireclays, found in all parts of the country, answers very well. But the ramming and drying, being dependent upon the individual skill and carefulness of the workmen, are naturally the points which require the most attention and are apt to get the least.

It was the consideration of the difficulties encountered in bottom making, at the Bessemer Works of the North Chicago Rolling Mill Company, which led Mr. A. L. HOLLEY to design the method of making bottoms to which I wish to call attention.

Evidently it will very much facilitate thorough drying, as well as careful and uniform running, if the bottom is made in separate pieces, which are, after drying, put together and connected by as small a portion as possible of fresh moist material. Accordingly, separate "bricks," as they are called, are prepared, conforming to the shape of the spaces between and around the tuyeres, leaving room enough between them, when in place, to finish the ramming, and no more. These bricks are of substantially the same material as the ordinary bottom stuff, and are made in an iron mould by ramming. When finished, they are removed from the mold—which is made in pieces—and taken to the oven, where they are dried, not burned, by a gentle heat for 24 hours, and are then ready for use. In making up the bottom, the tuyeres are first inserted in the tuyere-box, the bricks are then put in place between and around them and the spaces rammed up with fresh material. Each brick, in the making, gets the undivided attention of one man, and is, consequently, remarkably solid and homogeneous; and, by the slow drying, the cracks, which often follow the rapid heating of a highly plastic clay, are prevented. As will be seen from the drawing, the vertical surfaces of the bricks are roughened, to form a more perfect joint with the other stuff and hold it in place, and the washing out of the material from this space is of very rare occurrence. In ramming up the spaces care is taken that all the spaces are carried up together, not in layers, but by the addition of small quantities of material at a time, each of which is well rammed into the preceding one. The same precaution is taken in making the brick. All the bricks and bottoms are made in the daytime, each brick is stamped with the mark of the man who made it, and a record is kept of each bottom, showing the number of heats it made, the tuyeres renewed, if any, and the particulars of its working. The time required to dry a bottom thus made is short. Ordinarily, however, a bottom is 48 hours in the oven, although 12 are sufficient, and bottoms have been made, using brick fresh from the oven, which were ready for use when the ramming was finished. Instead of "ganister" bricks—as those made of bottom stuff are called—ordinary fire bricks, molded to the proper shape, may evidently be used, and in some cases with

* A paper read before the American Institute of Mining Engineers, at the Cleveland Meeting, October 26, 1875.

advantage. Fire bricks for this purpose are now made, and the comparative cost will determine, in any case, which material shall be used.

This method of bottom making has been in use over two years at the North Chicago Rolling Mill, and the results obtained are as follows, for the seven months ending October 1st, 1875, during which time, except for experimental purposes, the tuyeres of one maker were used. The average number of heats made by each bottom was, in the month of—

| | |
|---|---|
| March | 10·76 |
| April | 13·36 |
| May | 12·65 |
| June | 11·44 |
| July | 10·06 |
| August | 11·12 |
| September | 11·43 |
| The average for the whole period is | 11·45 |

The greatest number of heats made by a single bottom was 22 ; the least number, 7. The total number of bottoms used was 489, of which there were 327 above the average, 162 below, and only 7 of the minimum life, 7 heats. The mean pressure of the blast is twenty pounds per square inch.

The materials used in making a bottom are quartz, fire-clay and sand ; a small portion of ground fire-brick is occasionally used. The quartz is crushed by a Blake crusher and passed over a $\frac{5}{8}$ in. screen ; what passes the screen, varying in size from dust to $\frac{1}{4}$ in. cube, is used for the bottom. The clay is carefully dried and ground in a Bogardus mill. The fire sand is used as it comes without preparation. Having been well mixed, dry, the "batch" of stuff is sprinkled with water while being turned over upon the floor, and allowed to stand a couple of days before use. After ramming and drying, a cubic foot of this bottom stuff weighs 120 pounds, about the density of ordinary sandstone.

The quartz rock used is a very hard and compact quartzite, somewhat stained with oxide of iron. It is found near Marquette, in the Lake Superior region. Its analysis is :

| | | |
|---|---|---|
| Silica | 95·50 | per cent. |
| Alumina | 1·50 | " |
| Peroxide of iron | 2·75 | " |
| Lime } Magnesia } | ·40 | " |
| | 100·15 | " |

The fire-clay is a highly plastic, mottled red and white clay, from Southern Illinois. It contains :

| | |
|---|---|
| Silica | 50·50 |
| Alumina | 32·80 |
| Lime | 1·25 |
| Peroxide of iron | 1·60 |
| Water | 12·40 |
| | 98·55 |

The fire sand is from Central Illinois, and is a white decomposed sandstone, having the composition :

| | |
|---|---|
| Silica | 96 00 |
| Alumina | 1·25 |
| Peroxide of iron | 1·00 |
| Lime | ·50 |
| Water | ·50 |
| | 99·25 |

The mixture for the brick, made up of these materials, contains, neglecting small quantities of alkalies :

| | |
|---|---|
| Silica | 78·50 |
| Alumina | 13·50 |
| Peroxide of iron | 2 25 |
| Water | 5·00 |
| | 99·25 |

The other bottom stuff contains less clay, and consists of :

| | |
|---|---|
| Silica | 85·50 |
| Alumina | 8·75 |
| Peroxide of iron | 2·00 |
| Water | 2·85 |
| | 99·10 |

These refractory materials are not, it will be seen, of remarkable purity—the quantity of oxide of iron in all of them is sufficient to give the bottom stuff, while moist, a deep pink color—but the clay is unusually plastic, and the others are fairly good. The clay which is most deeply stained with oxide of iron is found to be the most plastic, and is, therefore, preferred—a highly plastic clay being necessary to cement the silicious particles together, although such a clay is not very refractory, and an excess of it makes the bottom liable to crack in drying. The advantages of this method of making bottoms are :

1. The rapidity with which bottoms can be made up. Four men and a boy, working about nine hours, make up four or five bottoms, fetching and mixing their own stuff. This enables all bottoms to be made on the day turn.

2. The facility afforded for inspection of the work in all its stages, and the carefulness which this imposes on the men.

3. The ease with which a perfectly dry bottom, well rammed, can be made. The solidity of the bottoms is remarkable. On several occasions an entire new set of tuyeres has been inserted in a bottom, and its life thus prolonged considerably, when, with a less solid bottom, such as is made by the ordinary method, this would not have been possible.

That this bottom has merits, the average of 11½ heats for seven consecutive months is pretty conclusive evidence. The regularity of the results in connection with the high number of heats averaged is particularly noticeable. A steady result of eight heats would not have been remarkable, but a continuous average of over eleven is, I think, unprecedented with the materials in use in this country.

It is noticeable that with the introduction of this bottom a great many of the mysterious events which formerly complicated the bottom question have disappeared. The metal (except in cases which can be readily accounted for) does not "work harder on the bottom" at one time than another ; the unfortunate tendency of the bottom to "flux" has been very much mitigated, and the whole catalogue of terms by which the workmen were wont to describe the ills of bottoms has been put out of use.

DISCUSSION.

In answer to a question, Mr. FRY, of the Cambria Iron Works, said they used burned brick made from ordinary fire-clay in making bottoms. They outlive the tuyeres. It was not customary with them to reset tuyeres when the bottoms were in use.

Mr. FORSYTH said that one tuyere, on an average, was replaced in each bottom in the North Chicago Works. The tuyeres were then simply plastered in with clay.

## A JAPANESE COAL MINE.

A FEW months after making his report on the Mines of Japan, which we will shortly review, the Hon. F. R. PLUNKETT, of Her Majesty's Legation at Yeddo, paid a visit to the coal mines in the neighborhood of the town of Karatsu, and his observations thereon possess great interest, partly because they give an account of the working of coal mines in the purely native manner, and partly because they show—to quote the words of Sir HARRY S. PARKES's covering despatch—how much more productive these mines might become if they were worked with the aid of foreign skill and capital.

The mines in question are situated in a valley which runs up at the back of the town, and the principal pits are about nine miles distant from it. The road to them, which, though extremely narrow and rough, is a good one, as roads go in Japan, passes up a valley of singular beauty and richness, from one to three miles wide, hemmed in by mountains, most of which are clothed with luxuriant forests to their very summits. The lowland is all well cultivated, and produces rice and cotton, while along the foot of the mountains wheat, millet, beans, and *kodzu* (the paper tree) grow in great quantities. The river which runs through this valley, nearly parallel to the road, is a regular mountain stream, with a broad bed and little depth of water, though apparently just sufficient to float the small boats which bring the coal down from the mines. The two districts near this river, from one of which the Japanese Admiralty draw their principal supplies of coal, contain a large number of different pits, each small in itself, but the aggregate of them producing a considerable amount of coal daily.

The pit visited by Mr. PLUNKETT, and which the Japanese consider a fair average specimen of the 40 other pits now at work in that part of the district, is about 2,200 yards distant from the river, and is situated in a small lateral valley. It has but one entrance—an adit bored through the rock about 4 ft. wide and 3½ ft. high, carried down at an angle of 56° until it reaches the seam of coal about 100 yards from the entrance ; thence it is carried on about 60 yards further, but at the bottom it becomes so small that it is only possible to advance by crawling on all fours. On either side of the main adit four side galleries have been opened, each from 10 to 12 yards in length, and not more than 3 ft. high ; from these the coal is taken, the seam being apparently worked to a thickness of only about 20 in., and considerable quantities of coal are left along the sides and top. There are scarcely any wooden supports, and no precautions seem to be taken against landslips, except just at the entrance, where for a few yards some wooden shoring has been put up to support the roof. The miners work lying on their backs or sides, and never can stand up. The coal is removed by means of small picks and wedges, driven in with a hammer, and is placed on small oblong bamboo baskets, each holding about 130 lb., provided with iron runners, which just fit the wooden sides of the ladder laid along the floor of the entrance adit ; this forms a kind of rude tramway, along which the baskets are hauled up to the surface ; they are drawn by boys apparently not more than 12 or 14 years old, who crawl on all fours, harnessed to the basket by a very short yoke, so short, indeed, that even when out of the mine, and working their loads across to the coal yard, they are still obliged to crouch in the same painful manner. They haul their loads up the incline, holding with their hands and feet to the ladder laid along the ground, and in the steeper portions of the adit an additional boy pushes from behind. The mine is lighted throughout with common open oil lamps, stuck here and there against the sides, and no care is taken to prevent accidents from fire-damp. Japanese miners say that no explosion has ever yet been heard of in any Japanese coal mine, and, therefore, they maintain that no precautions are required. This immunity that they boast of is, of course, due to their only working surface coal.

Mr. PLUNKETT's remarks on the ventilation of this pit prove clearly in what an elementary state mining is in those districts where foreign professional aid has not been availed of :—

As there is only one small adit to the pit, the ventilation below is atrocious. The only attempt made to improve it is that at the entrance of the adit, instead of leaving it wide open to the outer air, a small mud hovel, about 7 ft. square and 6 ft. high, has been built. There are no windows, but on one side is a small aperture about 2½ ft. high by 2 ft. wide, which serves as a door, and through which everybody must crawl to get in or out of the pit, for it is the only means of communicating with the workings. In the roof is an aperture of about 18 in. in diameter, on which a rude kind of chimney is made by seven *saké* (*i.e.*, wine or spirit) tubs, with their bottoms knocked out, piled one on the top of the other. A steady but slight draught of air is thus established between the small door and the chimney ; it passes across the mouth of the adit, and no further attempt is made to improve the ventilation of the pit. We were assured that at all the other pits in the neighborhood, although the adits in some cases run 400 yards into the hill side, the same rude contrivance is adopted.

Forty coolies are employed at this small pit, and they have six non-working days in the month ; they work in pairs, and are paid principally by task work, earning from 10d. to 15d. a day each, according to their strength and industry. This pit, Mr. PLUNKETT says, is little troubled with water, but the means used for getting rid of it, which are much the same in nearly all parts of Japan, are of the most primitive and inadequate description. The working galleries being only about 70 ft. below the surface, a large square well is dug just above them to a depth of about 50 ft., and the water from below is pumped into it by small hand bamboo pumps, capable of lifting about as much as an ordinary garden syringe. On the surface, close to one side of the well, stands a high post, on which works a long walking beam, at one end of which, fastened to a thick bamboo, is a large tub ; the bamboo is long enough to allow the tub to reach the bottom of the well, and at the other end of the walking beam four ropes are fastened. Inside the well, about 10 ft. down, is a small platform, on which a man stands to receive the tub as it comes up. When the tub is at the bottom of the well four men, holding the ropes mentioned above, run down the side of a small mound, thereby lifting the tub to the level of the platform, where the man, seizing it, turns the water over into a small channel made to carry it out into the valley, which is a few feet below, and where there is a small stream communicating with the river further down. The four men then walk up the hill again, thereby letting the tub fall to the bottom of the well to be re-filled, and so on till the water is reduced to the proper level. It is hardly possible that the tub can make more than 40 trips up and down in an hour,

and as it contains only about 20 gallons, the total amount that could be lifted by this means would not exceed 19,200 gallons in 24 hours.

The following is, in brief, the way in which the coal is transported from the pit's mouth to the port of Karatsu: It is taken to the river side in small carts, holding from 2 to 3 cwt. each, and making eight or nine trips a day each way. The drawers (men and women) are paid by task work, earning on an average about 1s. a day, and to do this they must walk over 20 miles. From the mine to the river side boards are laid down, forming a very rough kind of tramway. There is a gentle incline down to the river, which is considerably in favor of the "surface carriers," as compared with the unfortunate boys in the mine. The carts used are of two kinds—one is a bamboo basket, placed on low wheels, and fitted at each end with semi-circular shafts, bending downwards, so that the hind shafts can easily be made to act as a drag; the other is a narrow wooden box, mounted on two high wheels, and fitted with a pair of shafts about 7 ft. long, joined together at the end. The whole system for carrying the coal, remarks Mr. PLUNKETT, is of the most rude and unsatisfactory description, and the amount of time and labor wasted therein greatly increases the cost for delivery on board ship at Karatsu. When first brought to the surface the coal is not emptied into the carts, but shot on to the ground, whence it has to be picked up by hand, and placed piece by piece in the carts. *Mutatis mutandis*, the same foolish waste of time and labor occurs at the river side. The valley is broad, with a steady and gradual fall towards the river, so that the remedy for this senseless state of things is most easy. The flat-bottomed boats in which the coal is carried down to Karatsu, where they deliver it alongside vessels, are long and narrow, and worked by one man only; they usually hold about 1¼ ton, but some of them carry 3 tons. The current in the river is so strong that they run down to the sea without difficulty, but owing to causes alluded to before, it takes on average three days to get the coal from the pit's mouth to Karatsu.

The price of the coal at the pit's mouth is about 6s. 9d. per ton, and about 8s. 3½d. delivered at Karatsu. Mr. PLUNKETT was informed that these were the wholesale cost prices, but he says that 13s. per ton were paid for some delivered on board H. M.'s gunboat *Frolic*, in which he paid his visit to Karatsu. It was not found to answer well, as it burned fast, formed much clinker, had an immense percentage of ash, and fouled the tubes very quickly. Japanese naval and mercantile steamers, however, burn it, and it appears that "where, from the shortness of the passage, the amount of coal to be carried is of little consequence, and when the furnaces are specially constructed to burn dirty coal, it can be used with advantage, as it is cheaper than Takashima, and, of course, far cheaper than any foreign coal."

The mines in the district of which we have been speaking have only been worked for about four years, and we must not forget that they have been worked in the purely native fashion described above, without any attempt having been made to develop them by the aid of European science. This being borne in mind, the following table, showing the total amount of coal sold at Karatsu in 1873, 1874, and part of 1875, possesses some features of interest. The share taken each year for the Japanese Navy is also shown in each case, besides being included in each total:

| Year. | Total sold. Tons. | Used by Navy. Tons. |
|---|---|---|
| January to December, 1873 | 47,143 | 8,451 |
| January to December, 1874 | 54,878 | 14,360 |
| January to June 5, 1875 | 31,785 | 8,442 |

Reflecting upon the facts detailed in his report, and which he states from personal observation on the spot, Mr. PLUNKETT remarks in conclusion:

"When Europeans are allowed to take part in coal mining a better state of things can very easily be inaugurated; and the Japanese Government themselves would probably be the first to feel the advantages arising from the increased production and lower prices which will certainly be the result of invoking the aid of foreign enterprise and intelligence."—London *Mining Journal*.

## THE BISMUTH LODE, NEAR BEAVER, UTAH TERRITORY.

From the Polytechnic Review.

THE following statements from the contents of a letter received by the Editors from a thoroughly trustworthy and highly esteemed correspondent, who writes from Salt Lake City, will be found of interest. The subject is the occurrence of a bismuth lode in the neighborhood of Beaver City, Utah Territory, which our correspondent affirms to be unique and noteworthy.

"The bismuth lode embraces two locations, or claims, each 1,200 feet in length, and abutting against each other. One of them is known as the 'Starr King,' and the other as the 'San Francisco,' bismuth mine. It is a definite and unmistakable fissure vein, cutting through a white, calcareous sandstone overlying granite. The mountain-ridge called 'West Mountain' is composed entirely of granite, and the mining district in which this bismuth mine is situated is named therefrom 'Granite Mining District.'

"The San Francisco and Starr King Mines are located on one continuous and uninterrupted vein, cropping out hundreds of feet in length at intervals, and traceable on the surface. There are three veins of this ore, parallel with each other, definite and clearly visible, and projecting above the surface of the ground, and all three embraced within a width of 50 feet. They probably unite in depth, and I therefore recognize them as only one lode in fact, and as all three are embraced within the area of width allowed for location by the U. S. Mining Law of May 10, 1872, they are included in the same name. But the width of these veins varies. The widest stretches highest along the ridges upon which they outcrop. This is full six feet wide. The next below (all, indeed, are about on the same level), or toward the valley, is about two feet wide, and the third is about one foot in thickness.

"All are of the same character, carrying garnets and impregnated with bismuth sulphides and oxides. The veins are as definite, with hanging and footwalls, as the black lines on this paper (referring to letter). The wide vein has been opened with a shaft 70 feet deep, and a tunnel of 30 feet as some 600 feet from the shaft. Besides this, prospect openings have been made, showing the continuity of the lode at the opposite ends of the locations. The narrower veins have also been opened sufficiently to show the uniformity in character of all three of these fissure deposits.

"The metallic product of the whole lode will probably average from 3 to 5 per cent.; selected ores will carry as high as 15 to 20 per cent. of metallic bismuth. The ore has been concentrated to 40 per cent. in 'KROM'S Dry Concentrator,' and Mr. NICHOLS, KROM'S agent here, has certified in writing, that in large quantities it can be concentrated up to 60 per cent, or higher. Three per cent. ore concentrated by KROM'S dry process, yielded 34½ per cent. of metal by fire assay, in the hands of Mr. FRANK FOOTE, assayer, of this city; some six per cent. more, he thought, was lost by the imperfection of his method.

"These claims are so situated that they can be developed with advantage by drifting directly into the vein from the gullies which cut the lead at two or three points, or by tunneling into the face of the opens, or by shafts and levels run at different depths.

"The situation of the mine is eleven miles west of the town of Beaver, a place of some 4,000 inhabitants, and the seat of the First Judicial District of this Territory. It is about 225 miles south of this city. The Utah Southern Railroad is now built 75 miles southward, and is to be extended 150 miles further south this coming summer, and will pass quite near the mine in question. The position of the mine is therefore quit eligible for working. The mountain country, for miles around, is studded with the mountain cedar and pines, and water in sufficient quantity for all purposes requisite for driving machinery, etc., exists in the shape of an unfailing and ample spring. High up the mountain-side more water is found, which could be conducted, if required, to any part of the mine."

## ON THE PERCENTAGE OF IRON IN CERTAIN ORES.*

By Prof. Albert H. Chester, Hamilton College, Clinton, N. Y.

DURING the Summer of 1875 I visited some of the iron mines of Houghton County, Mich., and was quite interested to observe the progress made there within a few years. Working in open pits is gradually giving place to underground work in most of the mines where this system is practicable. In some cases, as in the Lake Superior Mine, the body of ore is so irregular, and the deposit so liable at any time to be pinched out, or nearly so, that it has been found impracticable, if not impossible, to lay out any plan for systematic underground work. But in many other mines the deposit is so regular in character, that the work can be laid out in shafts at regular intervals, and a series of sixty feet levels. The Michigammi Mine, opened in 1872, and first worked in 1873, is arranged on this plan, though some quarrying is still done. But the men are being put at overhead stoping as fast as it can be got ready for them, and before long it will all be worked in this way. The New York Mine is undergoing a similar change to the pillar system, and several others have either been changed, or it is about to be done.

My principal object in visiting this region was to obtain samples from some of the important mines, so as to be able to answer the question: "What is the average percentage of iron in the Lake Superior ores?"

Most iron furnaces work on mixtures of ore, so that it is impossible to tell, from their records, just the percentage in each one. For instance, I have before me the copy of one of the monthly returns of a blast furnace near Buffalo, N. Y. As many as five ores are used, besides rolling mill cinder. The percentage credited to each is as follows:

| | | | |
|---|---|---|---|
| Lake Superior, specular | 62·5 | Rossie, N.Y. | 54·5 |
| " " hematite | 49·5 | Wayne County, N.Y | 40·0 |
| Champion | 63·0 | Rolling mill cinder | 60·0 |

It is evident, if any one of these is placed too high or too low, that it affects the rest. The total average is stated in the return as 54·30 per cent., which is the only settled point; the details are mere guesses, depending on each other.

A prominent iron maker of Pittsburgh, when asked what he considered the average amount of iron in Republic ore, replied that he was not quite certain, though he used a great deal of it, but he supposed it to be from 68 to 70 per cent.

As reliable information could not be obtained, the parties interested not being willing to trust the published reports, average samples were procured from several mines, and the percentage of iron in each was carefully determined. In two cases samples of ore that had been shipped for sale were taken from the company's cars at some distance from the mines, and in the other cases, ore no better than the average was taken from the stock piles at the mines. The results obtained are as follows:

| | | | |
|---|---|---|---|
| Champion Mine | 65·47 per cent. of iron. | New York Mine | 61·01 per cent. of iron. |
| Republic " | 66·83 " " | Lake Superior Mine | 64·62 " " |

An average sample of Iron Mountain ore gave 64·87 per cent. of iron as the result of analysis.

My impression is, that the Lake Champlain magnetites will not show as large a percentage of iron as these hematites. Two lots that I have analysed show, respectively, 62·68, and 56.01 per cent. of iron. Undoubtedly, there are richer ores than these to be found in that region, but these samples were taken from the stock piles of blast furnaces, and the ore, in the first case, was called number one.

The average amount of iron in our Clinton ore, as shown by repeated analysis, is 44·57 per cent., while in the furnace it gives about 43 per cent. A sample taken from a pile of about three hundred tons of Staten Island limonite, showed 41·19 per cent. of iron.

I give these figures with considerable confidence, as I am sure that the samples were selected with the utmost care, and fairly represent the ores mentioned.

MASS-COPPER MINES ON LAKE SUPERIOR.—From the Houghton *Mining Gazette*, we take the following review. The present status of the "mass" mines of Keweenaw Point is highly encouraging. At the Phœnix a mass of 75 tons has just been thrown out at the 100-fathom level, and the appearance of the 110-fathom level, it is said, justifies the expectation of meeting with heavy copper in that, the bottom level. A large mass is being uncovered at the 160-fathom or bottom level of the Central mine, which repeated heavy charges of powder have failed to dislodge, indicating something unusually sizeable for even the Central, that mine being famous for its heavy and pure masses, and 190-fathom or bottom level of the Cliff mine contributes a part of the monthly product of heavy copper. These points are arguments unanswerable when the capabilities of mass-producing veins in depth are questioned. The pecuniary results of last year's business in operating these mines still further bear out the position we have taken. On working the Phœnix vein and mining 942 tons of mineral the profits realized equaled $75,000. The Cliff, on 825 tons, approaches an equal amount, and the Central cleared a handsome sum. The failure last year in mining for mass copper was the Copper Falls; yet this mine has had its good days, and those capable of judging maintain that its chances are good yet. It appears, then, that of four prominent mines working mass-producing veins last year three of them were highly successful; and most of our readers will acknowledge that this is more than an ordinary proportion of success in mining.

We make the following extracts from the Agent's Report. The total amount of ground broken in openings and stopes was 5,628 cubic fathoms.

During the past year we have sunk No. 3 shaft another 100-foot lift, the ground

* A paper read before the American Institute of Mining Engineers, at the Washington Meeting, February, 1876.

looks well. The stamp mill has continued to improve in condition, and consequently, has done its work with more economy than at any time heretofore.

In January we added to the washing apparatus another rotating slime buddle, which rewashes the headings from the other four machines of this class at a minimum cost.

Throughout the months of January and February we only operated two heads of stamps; in March two and one-half heads; and for the rest of the year, three heads:

The number of tons of rock stamped was ..... 80,000 tons.
Yield of mineral, per ton of rock stamped ..... 27·23 lb.
Yield of ingot copper, per ton of rock stamped ..... 19·58 lb.

The total cost of stamping and washing the rock was 87·96 cents per ton. This includes the cost of working the tail-house, and in fact, everything in any way pertaining to the mill, and also the cost of docking freight.

We commenced excavating ground in June for the foundation of the new pumping engine, which we erected during the summer, and inclosed the same in a substantial stone building 29x72 feet; with a wing (also of stone) 30x55 feet, in which the boilers are located. The engine commenced working November 1st. Its economy quite equals our expectations, and reflects credit upon the designer, JOHN WEST, Esq., of Norristown, Penn. It is the most complete and powerful machine of the kind in use in the Lake Superior region.

During the year the total amount of rock and other freight carried one mile, was 250,499 tons, at a cost of 4·78 cents per mile. The new locomotive, bought of the Baldwin Locomotive Works, does all the work satisfactorily, and is of sufficient power to do what is required of it in winter.

The total average force employed, including officers, was 316. Considering the amount of ground broken for each employee of the total force (17·8 fathoms), and the large amount of work done on construction account, it proves their efficiency.

The amount expended on improvements during the past year is equivalent to 2 1-5 cents per pound on the production of the mine.

ATLANTIC MINE.—The directors present the following statement of operations during the year 1875:

The production of mineral was 1,089 tons 897 lb., which yielded 71·92 per cent., or 1,567,036 pounds of ingot copper. The receipts of ingot copper, at New York, during the year, were 1,531,531 pounds, which realized an average price of 22·47 cents per pound.

The following is a summary of the year's business:

| | | |
|---|---|---|
| Copper sold (1,531,531 pounds) | | $344,172 12 |
| Copper in transit and at smelting works, 222,419 lb., valued at 19¼ cents net | $43,371 70 | |
| Less copper on hand Dec. 31st, 1874, as per last report | 34,579 09 | |
| | | 8,792 61 |
| Add balance of interest account | | 1,794 69 |
| | | $354 759 42 |

COSTS.

| | | |
|---|---|---|
| Atlantic Mine, being total payments for year, for labor, merchandise and supplies, machinery, etc. | $316,196 13 | |
| Add for increase of indebtedness at mine | 1,887 55 | |
| | $318,083 68 | |
| Less for increase of stock of mdse. and supplies at mine | 16,224 41 | |
| Making the gross expenditure at mine | $301,859 27 | |
| Deduct construction account, being payments for locomotive, pumping-engine, etc. | 34,532 41 | |
| Net costs at mine | $267,326 86 | |
| Smelting, freight, cost of marketing copper, and all other expenses, as per balance sheet | 44,852 89 | |
| Net operating expenses | | $312,179 75 |
| Showing a net profit of | | $42,579 67 |
| The assessment of $1 per share, payable April 5, 1875, was | $40,000 00 | |
| Of which was expended as above for construction purposes | 34,532 41 | |
| Leaving unexpended | | 5,467 59 |
| Add surplus Dec. 31, 1874, as per last report | | 51,537 89 |
| Making the net surplus, Dec. 31, 1875 | | $99,585 15 |

STATEMENT OF WORK DONE AT THE ATLANTIC MINE FOR THE YEAR ENDING DEC. 31, 1875, AND THE COST OF THE SAME.

UNDERGROUND EXPENSES.

| | | |
|---|---|---|
| Stoping 5,359 27-216 cubic fathoms, at $17 74 | $95,070 88 | |
| Drifting 1,429·9 feet, at $13.50 | 19,263 15 | |
| Sinking 95·2 feet, at $36 | 3,427 20 | |
| Timbering, tramming, and day work | 25,237 34 | |
| Powder, candles, fuse, etc., used on company account | 1,990 53 | |
| | | $144,989 10 |

SURFACE EXPENSES.

| | | |
|---|---|---|
| Labor | $44,439 88 | |
| Wood and supplies | 22,191 64 | |
| Feed for teams, shoeing, etc | 4,763 34 | |
| Taxes | 1,872 23 | |
| | $73,267 09 | |
| Less amount received for rents | 2,859 00 | |
| | | 70,408 09 |

GLOBE TRAIN RAILROAD.

| | | |
|---|---|---|
| Labor | $8,099 93 | |
| Fuel | 2,316 00 | |
| Supplies, ties, oil, castings, etc | 1,569 96 | |
| | | 11,985 89 |

STAMP MILL EXPENSES.

| | | |
|---|---|---|
| Labor | $29,741 40 | |
| 5,675 tons coal | 31,554 00 | |
| Supplies, castings, etc | 9,076 97 | |
| Total cost of stamping and washing 80,000 tons of rock | | 70,372 37 |
| | | $297,755 45 |
| Less for sundry credit items, profit on materials furnished contractors, merchandise and supplies sold men, etc | | 30,428 59 |
| Net operating expenses at mine for 1875 | | $267,326 86 |

CONSTRUCTION.

| | | |
|---|---|---|
| New pumping engine, engine house, etc. | $26,753 45 | |
| New washing machine at mill | 361 79 | |
| New locomotive, cost of widening cuts, etc., on railroad | 7,417 17 | |
| | | 34,532 41 |
| Total expenditure at mine | | $301,859 27 |

## REPORT OF THE PETROLEUM TRADE FOR FEBRUARY AND MARCH.

| | FEBRUARY. 29 Days. | MARCH. 31 Days. | INCREASE. |
|---|---|---|---|
| Stock on hand at the wells in barrels | 140,110 | 155,820 | 15,710 |
| Production for the month | 668,885 | 718,177 | 49,292 |
| Daily production | 23,065 | 23,167 | 102 |
| Producing wells | 3,638 | 3,670 | 32 |
| Drilling wells | 151 | 230 | 79 |
| Stock in iron tanks and pipe lines | 3,484,371 | 3,566,196 | 81,825 |
| Stock held by refiners | 110,354 | 107,234 | Decr. 3,120 |
| Total stock | 3,734,835 | 3,829,250 | 94,415 |
| Total shipments | 519,119 | 623,762 | 104,643 |

—*Stowell's Petroleum Reporter.*

## SELECTED LIST OF PATENTS.

FOR THE WEEK ENDING APRIL 14, 1876.

Relating to Mining, Metallurgy, Gas Making, Engineering, etc. Reported for the "Engineering and Mining Journal" by Louis Bagger & Co., Solicitors of Patents, Washington, D. C.

**175,303. Earth Augers, A. Rust, Macon, Mo.**—The body of the auger is cylindrical in cross-section at its upper end and elliptical at its lower end. The head is formed of two plates, held apart by interposed pieces, to form a rectangular opening for the auger-shaft. The arms of the bucket have upward projections, which serve to hold it open, by locking-keys passing behind them and through the head, when it is desired to empty the contents.

**175,318. Crossings for Composition Pavements, N. B. Abbott, Brooklyn, N. Y.**—A method of applying an elevated composition cross-walk to an asphalt pavement, by channeling the pavement for the edges of the cross-walk, and then laying said cross-walk upon the pavement.

**175,336. Portable Forges, J. Bayliss, New York City, N. Y.**—The segmental plate serves to direct the air and cause it to pass around the chamber before it enters the central chamber. The tube for discharging the ashes is provided with safety-valve. The double hood serves to retard radiation of heat.

**175,421. Pneumatic Signaling Apparatus, A. Chambers, No. 358 Marylebone Road, London, Eng.**—A semaphore-arm and a signal-lantern with "safety" and "danger" lenses, are so connected with a movable rod, which is operated by change of pressure in the air-pipe with which it is connected, that they are moved simultaneously, to indicate either "danger" or "safety" according as the levers which operate the compressors, are moved in one direction or the other.

**175,445. Gas Purifiers and Regulators, L. E. Fish, Washington, D. C.**—The sides of the purifying-pans are inclined inward, so as to support one on top of the other, and facilitate handling. The annular water seal for the cover of the purifier-tank is tapering in form (in cross section), the outer wall flaring from the sides of the tank.

## NOTES.

THE BANK OF NOVA SCOTIA has purchased the International Coal mines at Bridgeport, C. B., for the nominal sum of $7,000. We do not suppose the Bank will work the mines. They had better keep in view the fate of some Banking houses in England and Scotland which tried to work poor debts out of Coal mines and got in deeper.

STRIKE OF THE DELAWARE AND HUDSON CANAL COMPANY'S MEN.—Four hundred men, employed on the docks of the Delaware and Hudson Canal Company, at Rondout, N. Y., struck on Saturday for an increase of 50 cents per day. They were receiving $1. The men employed to unload boats also struck for the same wages they received last year, which was 7 to 8⅓ cents per ton. The company offered them 6⅓ cents.

THE PHILLIPSBURG WATER COMPANY is a fixed fact. It has fully organized with a capital of $40,000. The company propose to erect a building 30x30 feet, on the banks of the Delaware, not far above the Delaware bridge, and to place therein two engines of about 150 horse power each, and pumps with a capacity of 1,000 gallons per minute for each pump. The water will be forced to a reservoir and stand pipe up the east side of North Main Street to an elevation of 250 feet. A twelve inch pipe will be laid through all the principal streets, and six inch pipes in the side streets.—*Iron Era.*

BIG BLAST.—A blast of 1,000 kegs of powder was recently fired off in the Blue Tent Consolidated diggings, in Nevada County, which raised and loosened up ready for washing, about 200,000 cubic yards of dirt. The bank was over 200 feet in height over the part where the powder was exploded. A tunnel was run 120 feet, from which horizontal drifts were run 101 feet one way and 59 feet the other. The explosion raised the entire mass bodily to a height of four feet. It cost to do the work, and buy the powder, $4,243.07. The execution was wonderful, and the blast was a perfect success.

TIN IN MONTANA.—The mineral exhibit of Montana at the Centennial will comprise among other things, a number of specimens of lode and placer tin, and metal produced from the ore. The specimens are the contribution of Mr. H. M. HILL, of Clancy, Jefferson County. They are described as specimens from a mineral property that promises at some day to become exceeding valuable. It is affirmed that several mining districts in Montana contain tin ores in considerable quantity; but whether to an extent sufficient for profitable working remains yet to be shown.—*Polytechnic Review.*

BURNING PULVERIZED LIGNITE.—An examination of the apparatus now in use at the Golden Smelting Works, for burning pulverized Colorado lignite, shows that it is an undoubted success,—not only theoretically, but practically. The coal dust is forced into the furnace by a strong blast of air, producing an intense, yet even, heat, and effecting a saving of over $30 per day, per furnace, over the cost of wood. This apparatus has as yet only been applied to the matte furnace, but will be added in a few days to the slag reverberatory. We cannot help regarding this improvement as by far the most important advance of the year in Colorado metallurgy.—Denver *Mining Review.*

THE EFFECT OF A PROTECTIVE DUTY ON AMERICAN COAL IN CANADA.—The *Eastern Chronicle*, Nova Scotia, referring to the proposition made in the Dominian Parliament, to impose a duty of 75 cents on American coal entering Canada, says: "We pointed out that it was an absurdity to suppose that 75 cents per ton duty on American coal, would enable us to sell one ton more coal in the Ontario market—that the imposition of such a duty would not benefit our coal owners to the extent of one cent—that it would simply increase the cost of the article to the consumers in Ontario, and throw fresh burdens on the already burdened manufacturer—that in addition to this, it would involve us in the burdens and inequalities of a general protective system, which would necessarily increase the cost of living and the cost of production, and thus prove directly inimical to the interests of the coal owners and those dependent upon them, as well as upon all classes of producers and the people generally. That the imposition of a duty of 75 cents per ton on American coal, would be of no service to our coal owners is now proved beyond dispute. Nova Scotia coal can be sold in Montreal at $4.50 per ton. To carry it from Montreal to Toronto, would cost at the lowest calculation $1.50 per ton, bringing the price up to $6.00; *whereas American coal can be delivered at Toronto at* $4.10 *per ton.* What advantage would it prove to our coal owners to have a duty of 75 cents imposed on American coal? But Mr. RUTHERFORD, formerly Inspector of Mines in this Province, settled the matter most conclusively before the Depression of Trade Committee. In addition to a duty of 75 cents per ton on American coal, he asked for a bounty of $1.50 per ton, to be paid by the Government on Nova Scotia coal shipped to Ontario, in order to enable our coal owners to compete with the Americans—*protection to the extent of* $2.25 *per ton, or over one hundred per cent.* This most effectually disposes of the fallacious idea, that a duty of 75 cents on American coal, would benefit our coal owners."

## NOTES.

PRICE OF COAL AT SPRINGFIELD, MASS.—The Springfield *Union* says: There has been a decided downward tendency in the retail prices of coal in the past week, owing to a sharp competition among the dealers, the decline ranging from 50 cents to $2 per ton. Nut coal, both hard and soft, is now selling at the yard at $7 per ton, and stove size at $7.50, while Lykens Valley and bituminous have dropped from $11 per ton to $9 and $9.50 respectively. These prices are less than those of the Sovereigns, who ask $7.75 and $8. As a result of the change there is a marked increase in the sales, and the dealers say they never before had such a run of cash trade. Men who have always in the past had from 30 to 60 days' credit, and whom the dealers would willingly furnish on the same terms, do not even ask for "accommodation," but pay cash. The majority of the merchants, however, are not anxious to put in the "winter's supply" at the present prices, although one firm, it is said, are doing so, "delivered when wanted and pay when you get ready."

COAL IN BORNEO.—A Labuan correspondent of the *Straits Times Overland Journal* writes:—"In view of the want of success which has hitherto attended mining enterprise in Labuan, it is, I fear, hopeless to endeavor to induce the mercantile community of Singapore to turn its attention to the coalfields of Borneo, but there is not the least doubt that many large veins of coal, of easy access and close to excellent harbors, exist on the coast opposite to us, and Mr. Low ascertained on his last visit that a very extensive tract of country seems to abound in petroleum springs, which appear to promise a supply in the future equal to that which has been derived from America in recent years. The Sultan would be very glad to receive propositions for the working of the oil in his territories. The spots in which it is known to exist are in parts of the country which present no difficulties of any kind, and the springs are in many instances favorably situated for transport and shipment. It is to be regretted that Labuan does not possess the means of exploring these and other valuable mineral resources which are believed to exist in its neighborhood, but struggling as it has been for mere existence for years past, it has been unable to provide a steam pinnace to carry on its necessary communications with the coast, and the Acting Governor and Consul-General was obliged, on his recent visit, to take a passage in a cabin 2 ft. 6 in. high, in which he was confined for 36 hours, having had a very favorable passage for the time of year."

## STATISTICS OF COAL PRODUCTION.

*This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.*

Comparative Statement for the week ending April 15.

| Tons of 2,240 lb. | 1876. Week. | 1876. Year.* | 1875. Week. | 1875. Year.* |
|---|---|---|---|---|
| *Wyoming Region.* | | | | |
| D. and H. Canal Co | 60,783 | 492,830 | 58,518 | 757,547 |
| D. L. and W. RR. Co | 35,843 | 330,574 | 58,425 | 687,085 |
| Penn. Coal Co | 13,747 | 233,151 | 22,161 | 300,520 |
| L. V. RR. Co | 27,165 | 219,165 | 13,852 | 265,815 |
| P. and N. Y. RR. Co | 1,375 | 14,113 | 3,693 | 14,022 |
| C. RR. of N. J | 39,810 | 229,864 | 7,934 | 65,130 |
| | 178,723 | 1,531,997 | 164,583 | 2,090,119 |
| *Lehigh Region.* | | | | |
| L. V. RR. Co | 71,206 | 491,982 | 5,207 | 115,414 |
| C. RR. of N. J | 29,241 | 215,259 | — | 5,199 |
| D. H. and W. B. RR. | 531 | 10,821 | 990 | 9,433 |
| | 100,978 | 718,062 | 6,197 | 130,346 |
| *Schuylkill Region.* | | | | |
| P. and R. R. RR. Co | 116,201 | 697,897 | 22,158 | 271,952 |
| Shamokin & Lykens Val. | 8,764 | 72,486 | 19,042 | 236,422 |
| | 124,965 | 770,313 | 41,200 | 508,374 |
| *Sullivan Region.* | | | | |
| Sul. and Erie RR. Co | 883 | 16,261 | 454 | 4,493 |
| Total | 475,554 | 3,036,633 | 212,424 | 2,733,332 |

* Year beginning January 1st.

The above table does not include the amount of coal consumed and sold at the mines, which is about seven per cent. of the whole production.

*The receipts at Port Richmond* for the week were 63,000 tons, shipments 40,000 tons, and balance on hand 137,500 tons.

*The decrease of shipments of Cumberland Coal* over the Cumberland Branch and Cumberland and Pennsylvania Railroads amounts to 56,530 tons, as compared with the corresponding period in 1875.

*Perth Amboy business:*

| | Tons. |
|---|---|
| Received for the week | 27,284 |
| Shipped for the week | 21,885 |
| On hand April 15 | 95,675 |

Freights to Boston, $1.10; New Haven, 65c.; Norwich, 80c; Bridgeport, 65c.

*The Exports of Coal from Baltimore* for the week were .... tons, and since Jan. 1st, 10,860 tons, as against 18,343 tons for the corresponding period of 1875.

*Receipts of Coal at Boston*, for week ending April 14, and years from September 1st, 1874 and 1875.

| From | Week. Tons. | Previously. 1876. Tons. | 1875. Tons. |
|---|---|---|---|
| Alexandria and Georgetown | — | 55,504 | 46,896 |
| Philadelphia | 6,385 | 378,732 | 272,455 |
| Baltimore | 600 | 81,987 | 84,335 |
| Other places | 2,509 | 171,674 | 110,523 |
| Great Britain | 1,281 | 2,830 | 2,124 |
| Nova Scotia | — | 12,851 | 14,942 |

*Belvidere Delaware RR, report.*

| | Week. | Year 1876. | Year 1875. |
|---|---|---|---|
| Receipts of coal at Coal Port (Trenton) | 9,760 | 29,810 | 206 |
| " " " South Amboy | 14,174 | 120,876 | 17,196 |
| Shipments at Coal Port (Trenton) | 9,409 | 25,165 | 196 |
| " South Amboy | 10,422 | 110,116 | 94,395 |

**The Production of Bituminous Coal** for the week ending April 15, was as follows:

Tons of 2,000 lb., except where otherwise designated.

| *Cumberland Region, Md.* | Week, Tons. | Year, Tons. |
|---|---|---|
| Tons of 2,240 lb | 25,339 | 333,245 |
| *Barclay Region, Pa.* | | |
| Barclay RR., tons of 2240 lb | 7,526 | 112,242 |
| *Broad Top Region, Pa.* | | |
| Huntingdon and Broad Top RR | 3,440 | 44,317 |
| *East Broad Top | 1,228 | 19,888 |
| *Clearfield Region, Pa.* | | |
| *Snow Shoe | 1,125 | 16,333 |
| *Tyrone and Clearfield | 24,564 | 276,878 |
| *Allegheny Region, Pa.* | | |
| *Pennsylvania RR | 4,525 | 54,275 |
| *Pittsburgh Region, Pa.* | | |
| *West Penn. RR | 4,580 | 62,062 |
| *Southwest Penn. RR | 884 | 16,317 |
| *Penn. & Westmoreland gas coal, Pa. RR. | 15,466 | 176,148 |
| *Pennsylvania RR | 4,222 | 87,340 |

* For the week ending April 7.

**The Production of Coke** for the week ending April 7.

| Tons of 2000 lb. | Week. Tons. | Year. Tons. |
|---|---|---|
| Tyrone and Clearfield | .. | .. |
| Alleghany Region | .. | .. |
| West Penn. RR | 747 | 12,939 |
| Southwest Penn. RR | 8,537 | 116,714 |
| Penn. & Westmoreland Region, Penn. RR. | 620 | 8,795 |
| Pittsburgh, Penn. RR | 2,658 | 57,039 |
| Total | 12,564 | 195,487 |

## COAL TRADE REVIEW.

NEW YORK, Friday Evening, April 21, 1876.

### Anthracite.

THE demand for anthracite coal does not increase nor are there indications of an early revival. Manufacturing industries are so depressed that they are taking but very limited supplies, while most of the retail dealers are carrying considerable stocks, owing to the mild weather which prevailed during the winter and the great economy introduced by housekeepers. Stocks of coal are accumulating rapidly on all sides, and reductions in the out-put are already being made, with further ones talked of.

The Anthracite Board of control at a meeting held in Pennsylvania last week resolved to advance prices 5c., per ton for the month of May and reduce shipments to tide-water 140,000 tons; the original allotment having been 1,040,000, while shipments will be limited to 900,000 tons.

Although the indications are that the consumption of anthracite coal will not be so great as during 1875, yet a vast amount of coal will be required, and it is quite possible that if a very large proportion of the trade should postpone purchases till late in the season, the companies might be so pressed with work as to be able to advance prices considerably. The present indications, however, are that the policy of the companies will be rather towards fostering trade by low prices than by insisting on high rates. Experience is fully confirming the soundness of the views constantly advocated by us during the past two years, and the policy of the Combination is steadily approaching them. We are well aware that the statements we have to make in representing the actual very depressed condition of the market, are not generally popular, and are always disagreeable to us, yet as we see the condition of the country, any effort to create "good times" by glowing predictions, would not only be entirely useless, but would be a positive injury. The whole business of the country, of the world, in fact, is settling down to a lower range of values, and the wisest course is for our manufacturers and producers to recognize the facts and take in time suitable measures to meet successfully the new order of things. We have thought the coal companies somewhat slow in appreciating the actual condition of the country, though in criticizing in a friendly way their acts, we have always been ready to do justice to the wisdom and moderation of their policy.

### Bituminous.

In the Cumberland region the most engrossing topic is the status of the Consolidation Coal Company. That company opposed bitterly the proposition to reduce, by one cent a ton per mile, the exorbitant rates of freight charged over its railroads; but on the passage, by the Legislature of Maryland, of this act, the Consolidation Coal Company endeavored to evade the law by selling the railroad to the coal company that already owned almost all its stock, and making a change in the name of the railroad company.

This clever little device appears to have obtained but a very partial success, though it was made use of to try and run up the stock of the company, as noted in our last two issues. The reaction has already set in, as will be seen in our stock report, though the company is collecting the old rate of freight, totally ignoring the recently enacted laws.

The Cumberland *News* tells that the other Cumberland coal companies have presented a petition to the Governor, requesting him to have a suit instituted against the Consolidation Coal Company and the Cumberland and Pennsylvania Railroad Company, and if these still continue to evade the law to vacate their charters. It is generally believed the Governor will accede to the request, and hence the impression seems to be gaining ground that in the unworthy policy it has been pursuing this company may bring upon itself greater evils than a simple reduction of one cent per ton per mile in its railroad freights. In the meantime the coal companies are generally paying the full rates demanded, but with an agreement that if the Courts decide that the rates should be in conformity with the recent law, the difference between the old and the new rates shall be refunded without further litigation.

There has also been a rumor that the Cumberland and Pennsylvania Railroad, has been sold to the Baltimore and Ohio Company, but the rumor lacks confirmation.

This last company has again reduced the freight from Piedmont to Locust Point from $2.15 to $2.08 per ton of 2,000 lb. This is to meet the reduction recently announced in tolls on the canal.

The Cumberland and other bituminous interests are likely to meet with a new and very formidable rival in the anthracite coal dirt and coal dust, which the Philadelphia and Reading Railroad Company is now burning with the most unqualified success. As this coal dust is not only a waste material, but a positive nuisance, and is piled up in enormous quantity at the mines, it can be placed in market for scarcely more than the bare cost of transportation. Should it be delivered here at say $3 per ton, and at from $3 to $4 per ton to the Eastern ports and that its use generally is as successful as it has been proved by Mr. WOOTEN'S experiments, the bituminous interests will find in it an unexpected and exceedingly formidable competitor for manufacturing and general steam generating purposes.

### Coal Trade of Philadelphia.

PHILADELPHIA, April 20, 1876.

The blockade of loaded cars on the Reading continues, and the condition of things reported last week, still exists with no better prospect of being corrected. There is with the company a great excess of the sizes which are not needed, and quite a scarcity of those for which they have orders. For outside parties the scarcity is general, owing to the short supply of cars at the mines, and the delay in receiving what coal is loaded. It was hoped that some measure would have been taken before this time to prevent this excess of unsalable sizes from being forced on the company, and assist them in supplying more cars for coal actually needed, but nothing seems to have been done, or if any steps have been taken, they have had no effect. Vessels are not so plenty, but the freights still remain low, and the same as last quoted.

***Wholesale Prices of Anthracite Coal for April, f.o.b. at the Tide Water Shipping Ports per ton of 2240 lb.***

| | Lump. | Steamer. | Grate. | Egg. | Stove. | Chestnut. |
|---|---|---|---|---|---|---|
| **Wyoming Coals.** | | | | | | |
| ‡Lackawanna and Scranton at Hoboken and Weehawken | 4 60 | 4 70 | 4 80 | 4 90 | 5 50 | 4 70 |
| Pittston at Newburg | 4 45 | 4 55 | 4 65 | 4 75 | 5 35 | 4 55 |
| Wilkesbarre at Port Johnston | 4 60 | 4 70 | 4 80 | 4 90 | 5 50 | 4 70 |
| Plymouth, R. A. | .... | .... | 4 80 | 5 00 | 5 60 | 4 80 |
| Susque. Coal Co. at Amboy W.A. | 4 60 | 4 70 | 4 80 | 5 00 | 5 50 | 4 80 |
| Kingston at Hoboken | 4 60 | 4 70 | 4 80 | 4 90 | 5 50 | 4 70 |
| **Lehigh Coals.** | | | | | | |
| Old Company at Port Johnston | 5 10 | .... | 4 90 | 4 90 | 5 50 | 4 80 |
| Old Company's Room Run " | 5 10 | .... | 4 90 | 4 90 | 5 50 | 4 80 |
| §Sugar Loaf, Hobok. & Amb." | 5 10 | .... | 4 90 | 4 90 | 5 50 | 4 80 |
| Lehigh Coal Exchange " | 5 10 | .... | 4 90 | 4 90 | 5 50 | 4 80 |
| Honey Brook Lehigh | 5 10 | .... | 4 90 | 4 90 | 5 50 | 4 80 |
| Beaver Meadow at South Amboy | 5 10 | .... | 4 90 | 4 90 | 5 50 | 4 80 |
| **Schuylkill Coals at North 9th st., Brooklyn, E. D.†** | | | | | | |
| Schuylkill white ash | 4 60 | 4 70 | 4 80 | 4 90 | 5 50 | 4 70 |
| Schuylkill red ash | .... | .... | .... | 5 00 | 5 60 | 4 70 |
| Shamokin white and red ash | .... | .... | .... | 5 00 | 5 60 | 4 70 |
| Lorberry | .... | .... | 5 70 | 5 70 | 5 70 | 4 75 |
| Lykens Valley | .... | .... | 6 10 | 6 10 | 6 10 | 5 20 |

* Contractor's prices are 20c. per ton less.

†The prices of Schuylkill coals for shipment from Philadelphia are 35c. per ton less than at Brooklyn.

‡ Boats towed by the D. & H. C. Co. at its expense to and from New York harbor.

| | Per ton. |
|---|---|
| Freight from Hoboken and Weehawken to New York | 35@40c. |
| " " Elizabethport & Port Johnston to N. York. | 40c. |
| " " South Amboy to New York | 40c. |

Freight by the boats of the companies from Hoboken, Port Johnston, Weehawken, Rondout, South Amboy and Perth Amboy to New York City and vicinity 50c.

Freight by the Pennsylvania Coal Company's boats from Newburg to New York 65c.

### *Wholesale Prices of Bituminous Coal.*

*Domestic Gas Coals.*

| Per ton of 2240 lb. | At the Shipping Ports. | Alongside in New York. |
|---|---|---|
| Westmoreland and Penn. at Greenwich, Philadelphia | $4 70 | $5 00 |
| " " at S. Amboy | 5 50 | 6 00 |
| Red Bank Cannel Pa. at Philadelphia | 8 00 | 8 50 |
| " " South Amboy | 8 50 | .... |
| " Orrel | 6 00 | 6 50 |
| Youghiogheny, Waverly Co., at Balt. | 4 25 | 5 75 |
| Despard, West Va., | 4 50 | 6 00 |
| Murphy Run, West Va., at Baltimore | 4 50 | 6 00 |
| Fairmount, West Va., " " | 4 50 | 6 00 |
| Newburgh Orrel, Md. " " | 4 50 | 6 00 |
| Cannelton Cannel, W. Va., | .... | 10 00 |
| " Splint, " at Richmond. | 4 50 | 6 00 |
| Peytona Cannel, " " | 8 50 | 10 00 |

*Manufacturing and Steam Coals.*

| | | |
|---|---|---|
| Cumberland, at Georgetown and Alexandria, Va | 3 65@3 75 | 5 00 |
| Cumberland, at Baltimore | 3 90@4 00 | 5 25 |
| Kittanning f. o. b. Canton, Baltimore | 4 25@4 35 | |

Rockhill Semi-Bituminous and Broad Top, at the mine, per 2,000 lb., 90, f. o. b. Greenwich, Philadelphia, per 2240 lb, 3 70@3 95, according to destination; at Amboy, 4 65@4 90; New York, 5 10@5 25.

Clearfield and Allegheny, "Kittanning," "Sterling," "Sonman," and "Eureka," at the mines, per 2000 lb., 90; at Greenwich, Phil., per 2240 lb., 3 90, 4 00, 4 25, and 4 50, according to destination; f. o. b. South Amboy, N. J., 4 70@5 00; New York, 5 25.

*Foreign Gas Coals.*

| | Sterling. | Am. cur'cy. |
|---|---|---|
| Newcastle, at Newcastle-on-Tyne | 9/6@11/ | 6 50@7 00 |
| Liverpool House Orrel, at Liverpool | 26/ | 13 00 |
| Ince Hall Cannel " | 42/ | 18 00 |
| " Gas Cannel " | 28/ | 13@14 |
| Scotch Gas Cannel, at Glasgow, nominal, | 25/ | 7 50 |
| | Gold. | |
| Block House, at Cow Bay, N. S | 2 00 | 5 00 |
| Caledonia, at Port Caledonia | 1 50 | 4 75 |
| Glace Bay, at Glace Bay | 1 50 | 4 75 |
| Lingan, at Lingan Bay | 1 75 | .... |
| Sydney, International and Reserve mines, at Sydney | 2 00 | 5 50 |
| Pictou, Albion & Vale mines, at Pictou. | 2 25 | 5 75 |

### *Retail Prices in New York.*

*Anthracite.*

| Per 2000 lb. | Grate and Egg. | Stove. | Chestnut. |
|---|---|---|---|
| Pittston coal, in yard | $5 70 | $6 00 | $5 30 |
| Lackawanna coal, delivered | 6 25 | 6 75 | 6 00 |
| Wilkes-Barre, " | 6 25 | 6 75 | 6 00 |
| Lehigh & Locust Mountain, del'd | 7 00 | 7 00 | 6 00 |
| Schuylkill Red Ash, del'd | 7 50 | 7 50 | 6 00 |

The Cost of delivery for Pittston coal ranges from 40 cts. to $1 10 per ton, according to distance from the yard.

*Bituminous.*

| | | | |
|---|---|---|---|
| Liverpool House Orrel, delivered, per ton of 2000 lb | | | $18 00 |
| Liverpool House Cannel | " | " | 22 00 |
| American " | " | " | 13 00 |
| Kanawha splint, | " | " | 12 00 |
| American Orrel | " | " | 11@14 |
| Red Bank Cannel | " | " | 14 00 |
| Cumberland | " | " | 7 00 |

† This quotation is furnished to us by Messrs. WARD, TALBOT & OLYPHANT.

### Baltimore, Md. April 20, 1876.

Reported by our Special Correspondent.

ANTHRACITE.

Wholesale or Trade Prices per 2240 lb.

| *Wilkes-Barre "Lee" or "Diamond," Pittston and Plymouth.* White ash. | In cars at depot. | By boats afloat. |
|---|---|---|
| Lump and steamboat | $4 62 | $4 47 |
| Broken | 5 21 | 5 06 |
| Egg | 5 35 | 5 20 |
| Stove | 5 51 | 5 36 |
| Nut | 4 66 | 4 51 |
| *Shamokin, (red or white ash), and "Boston," free burning white ash,* | | |
| Egg | 5 35 | 5 18 |
| Stove | 5 50 | 5 43 |
| *Lykens Valley, red ash,* | | |
| All sizes | 6 05 | 6 68 |

From wharf or yard, wholesale, 50@75c. additional. By retail, all kinds and sizes, per 2240 lb.

BITUMINOUS.

| | |
|---|---|
| George's Creek and Cumberland f. o. b. at Locust Point | 4 00 |
| West Virginia f. o. b. at Locust Point | 4 50 |
| Youghiogheny Gas, f. o. b. at Locust Point | 4 50 |
| Swanton Coal, George's Creek | 4 00 |

### Boston. April 15, 1876.

The market for anthracite is dull. Very few if any orders to ship have gone forward, and the companies are piling up a very large stock. There is now a feeling that the resumption of work was fully two weeks too soon, as the lethargy in sales suggests that possibly by the middle of July another vacation will be necessary to overcome the economy in consumption and the cost of advances to mine and carry the surplus stocks.

The lull in sending orders for small shipments on account is owing partly to the advance in freight rates. So long as a dealer or a consumer can delay ordering, so long he is inclined to believe freight rates will yield to his advantage. The strike in the Cumberland district may so influence the Baltimore shipping as to again overrun the New York and Philadelphia markets, hence the prospect for lower freight rates has some truly encouraging signs.

BITUMINOUS is a little staggered by the strike outside of the Consolidation mines. The sale of the Consolidation railway; the presenting of two months' freight bills to the mining companies by the railroad at 3c. per ton, notwithstanding the vote of the Leislature to reduce the toll to 2c. and the multiplicity of snarls and evils, suddenly sprung all through the Cumberland district. In all, the market is considerably perplexed by the many rumors, but as yet no discomforts are experienced in getting coal to tide water, and the various markets are supplied.

FREIGHTS are nominally unchanged, quoting New York at $1, Philadelphia $1.40@1.50, Baltimore to Boston $1.65, and Georgetown to Providence $1.50.—*Commercial Bulletin.*

### Buffalo, N. Y. April 19, 1676.

Reported by our Special Correspondent.

ANTHRACITE.

| | Afloat. f.o.b. | Retail, Deliv'd. |
|---|---|---|
| Grate | $6 40 | $7 40 |
| Egg | 6 40 | 7 40 |
| Stove | 6 85 | 7 85 |
| Nut | 6 60 | 7 60 |

| | Lump. | Run of Mine. | Nut. | Slack. | Nut & Slack. |
|---|---|---|---|---|---|
| Connellsville Coke | $5 15 | .... | .... | .... | .... |
| Brookfield Coal | 4 25 | .... | .... | .... | .... |
| Briar Hill | 4 25 | .... | 2 80 | .... | .... |
| Youghiogheny | 4 50 | .... | .... | .... | .... |
| Monterey | 3 30 | 3 25 | .... | 2 30 | .... |
| Catfish | 3 30 | 3 25 | .... | 2 30 | .... |
| Stoneboro | .... | Bk'n | .... | 2 30 | .... |
| Cannel | 5 50 | 4 75 | 4 50 | .... | .... |
| Cameron | 3 50 | 3 00 | .... | 2 30 | .... |
| Reynoldsville | 3 65 | 3 50 | 3 00 | 2 30 | .... |

### Chicago, Ill. April 19, 1876.

Specially reported by Messrs. RENO & LITTLE, Coal Merchants.

Retail prices per ton of 2000 lb. delivered to buyer.

No change.

BITUMINOUS.

| | | | |
|---|---|---|---|
| Lehigh Lump | $10 50 | Briar Hill and Erie | @ 6 00 |
| Lehigh grate and egg | 10 50 | Walnut Hill, Pa | @ 6 50 |
| Lehigh stove and chest. | 11 00 | Midway, Pa | @ 6 50 |
| Lackawanna, Wilkes Barre and Pittston* | | Cannel | @ 8 00 |
| Grate and egg | 9 50 | Blossburg | 7 50 |
| Stove and chestnut | 10 00 | Indiana Block | 6 00 |
| | | Hocking "Brooks" | 6 50 |
| | | Wilmington and Illinois. | 5 00 |

* 50 cents off these prices for car load lots to country dealers and manufacturers.

### Cincinnati, O. April 17, 1876.

Reported by our Special Correspondents.

Trade quiet. Coal continues to arrive almost daily, without much effect on prices. Following are the quotations:

| Per ton of 2000 lb. | Bush. | Ton. |
|---|---|---|
| Youghiogheny, or Pittsburgh, afloat | 7¾@8c. | — |
| Pomeroy coal " | 5½@6c. | — |
| Kanawha " " | 7½c. | — |
| Cannel coal, according to quality " | 18 c. | — |
| The following are the retail prices delivered | | |
| Youghiogheny | 10c. | — |
| Pomeroy | 9c. | — |
| Cannel | 22c. | — |
| Kanawha Semi-Cannel | 10c. | — |
| Anthracite, per ton | 10 50@11 00 | — |
| Coke, at yard | 7c. | — |
| Coke, hard and soft, delivered | 9c. | — |

### Cleveland, O. April 17, 1876.

Specially reported by Messrs. BATES & MARTIN.

Quotations in this market are as follows:

Per ton of 2000 lb. f. o. b. vessels.

WHOLESALE.

| | For vessels, | On cars. |
|---|---|---|
| Youghiogheny Gas Coal | $4 40 | $4 15 |
| Cannel | 4 50 | 4 15 |
| Blossburgh | 5 00 | 5 00 |
| Briar Hill, Block Coal | 3 70 | 3 40 |
| Straitsville Coal Co, lower vein | 3 20 | 3 00 |
| Mineral Ridge | 3 10 | 3 25 |
| Massillon | 3 20 | 3 30 |
| Tuscarawas Valley | 2 70 | 2 70 |
| Columbiana | 2 70 | 2 60 |

RETAIL DELIVERED.

| | Lump. | Nut. |
|---|---|---|
| Briar Hill | $5 00 | $3 50 |
| Massillon | 4 50 | 4 00 |
| Mineral Ridge | 4 50 | 4 00 |
| Columbiana | 3 25 | 3 00 |
| Straitsville Coal Co., lower vein, | 3 75 | 3 50 |
| Tuscarawas Valley | 3 25 | 3 00 |

ANTHRACITE DELIVERED.

| | Grate. | Egg. | Stove. | Chestnut. |
|---|---|---|---|---|
| Lehigh | $9 50 | $9 50 | $10 00 | $9 75 |
| Wilkes-Barre | 8 00 | 8 00 | 8 50 | 8 25 |
| Lackawanna | 8 00 | 8 00 | 8 50 | 8 25 |

### Louisville, Ky. April 17, 1876.

Specially reported by Messrs. BYRNE & SPEED.

Our market is now, as during most of the Winter, very quiet.

### Milwaukee, Wis. April 17, 1876.

Specially reported by Messrs. R. P. ELMORE & Co.

Trade continues all that could be expected for the close of the coal season, with prices unchanged. There will be some little coal carried over by some yards here, while, we are pleased to say, we shall close out all.

Retail price per ton of 2000 lb.

| | | | |
|---|---|---|---|
| Lehigh Lump | $10 00 | Briar Hill, select | $8 00 |
| Lehigh Prepared | 11 00 | Blossburgh | 8 00 |
| Lackawanna (all sizes) | 10 00 | Cannel | 8 00 |
| Pittston | 10 00 | Pittsburgh | 7 00 |
| Scranton | 10 00 | Steam coal | 5 00 |

### New Orleans, La. April 15, 1876.

Reported by C. A. MILTENBERGER & Co.

We can report a slight advance on wholesale rates since our last, while retail prices remain unchanged. Stock small, but an abundance of coal may be anticipated during this and next month. We quote:

| | |
|---|---|
| Pittsburgh coal, retail, per bbl | 30c. |
| " wholesale | 50c. |
| " steamboats, per box | 50c. |
| " to manufacturers, per bbl | 50c. |
| " shipments, per hhd | $6 00 |
| Anthracite, wholesale, per ton | .... |
| " retail, " | 12 50 |
| Virginia Cannel, per bbl | 80c. |
| Scotch " " | 80c. |
| Mt. Carbon, wholesale, per bbl | .... |
| " " retail, " | 55c. |
| St. Bernard wholesale, per bbl | .... |
| " retail, " | 50c. |

### Richmond, Va. April 17, 1876.

Specially reported by S. H. HAWES, Dealer in Coal.

Per ton of 2240 lb., f.o.b.

| | | | |
|---|---|---|---|
| Kanawha Cannel | $9 00 | New River Bituminous | $4 50 |
| " semi-Cannel | 4 75 | Clover Hill Coal | 4 00 |
| Coalburgh Splint | 4 75 | James River Bitum | 3 30 |
| Lewiston " | 4 75 | " " Carbonite | 5 80 |
| Kanawha Gas coal | 4 50 | | |

### San Francisco, Cal.

From the *Commercial Herald*, April 13, 1876.

Imports from Jan. 1st to March 1st:

| | tons. | | tons. |
|---|---|---|---|
| Anthracite | 4,139 | English | 5,502 |
| Australian | 11,823 | Vancouver Island | 10,657 |
| Coos Bay | 7,520 | Rocky Mountain | 64 |
| Cumberland | 2,044 | Seattle | 12,854 |
| Mt. Diablo | 17,700 | Bellingham Bay | 3,175 |

Receipts and imports for the quarter from all sources show a steady increase as compared with same period last year. There has been an increase in the Colonial supply, and a large apparent falling off in the receipts from the California (Mt. Diablo) mines. We think this falling off in our city receipts is chargeable to increased interior and railroad demand that does not need to be brought to this city or embraced in our statistics. The Seattle mines have largely increased their product, and so also the mines of Vancouver Island. English supplies have diminished, yet there is every prospect of a large increase in Scotch and English steam coals for the balance of the year, as it is generally reported and believed that some 30,000 tons or more have recently been contracted for at $8@$8.50 per ton, and some cargoes said to be placed as low as $7 75. There are at date several cargoes now offering for forward delivery at 8@$8.25. The freight paid on this coal from Liverpool is 15/@16/ per ton. The cargo of 704 tons anthracite per *Dietz*, from Philadelphia is reported sold at $12. It is said that the Gas Company has recently contracted for some 10,000 tons Australian, to arrive, at $9.50, and the Pacific Mail Company 5,000 tons Sydney steam, to arrive, reported at $8.50, a very low figure. Receipts for the week embrace 1,870 tons Nanaimo, per *Arkwright*; 900 tons Wellington, per *Amie*, from Departure Bay; 500 tons Coos Bay, per *Empire*; besides other small arrivals of same per sail. The *Commodore*, from Seattle, brought 1,400 tons. The spot market is fully supplied with nearly all descriptions. The mines of Vancouver Island are being worked freely and their product steadily increased. The Wellington is a growing household favorite, and by some preferred to all other kinds. We continue to quote Australian, $10@10.25 ex ship. Supplies of Cumberland are well controlled, and in casks held at $22; bulk, $18. Lehigh is plentiful and prices nominal. We quote Bellingham Bay at $8.50; Coos Bay, $10; California Mount Diablo Steam, $6.25@$8.25 for fine and coarse respectively; English and Scotch Steam, $9@9.50; Nanaimo, $9.50@$10; Seattle, $9.50@$10; Anthracite, $12@$15; Lehigh, $14@$15; Wellington, $11@$12 latter screened. The *Lookout* from Bellingham Bay adds 1,305 tons to our spot supply.

### Toledo, Ohio. April 17, 1876.

Specially reported by Messrs. GOSLINE & BARBOUR.

We quote coal as follows:

Per ton of 2000 lb. on cars.

| | | | |
|---|---|---|---|
| Hocking Valley | $3 40 | Massillon | 3 60 |
| Straitsville | 3 40 | Youghiogheny | 5 00 |
| Shawnee | 3 40 | Blossburg | 6 50@7 00 |
| " nut | 2 90 | Cumberland | 6 50@7 00 |
| Briar Hill | 5 50 | Connellsville coke | 5 40 |

ANTHRACITE.

| | | | |
|---|---|---|---|
| Grate, screened | $7 20 | Stove, screened | $7 70 |
| Egg, " | 7 20 | Chestnut " | 7 45 |
| Lehigh Lump | 9 50 | | |

40 cents to $1 per ton additional for delivery at retail.

### Halifax, N. S. April 17, 1876.

Prices per ton of 2240 lb. in gold.

| | | | |
|---|---|---|---|
| Sydney (old mines) | $4 00 | Little Glace Bay | 3 35 |
| Gowrie | 3 35 | Blockhouse | 3 35 |
| Victoria | — | Albion (at Railroad) | 4 00 |

### Montreal. April 17, 1876.

Specially reported by Messrs. ROBERT C. ADAMS & Co.

Wholesale per ton of 2240 lb.

| | | | |
|---|---|---|---|
| Scotch Steam | $6 00 | Cape Breton Steam | $5 25 |
| Pictou " | 5 75 | Newcastle Smiths | 7 50 |

Anthracite at retail, per 2000 lb., delivered.

| | | | |
|---|---|---|---|
| Egg | $8 50 | Chestnut | 8 50 |
| Stove | 9 50 | | |

## Rates of Transportation on Anthracite Coal to Tide Ports.

| Lehigh and Wyoming Coals. per ton of 2240 lb. | From Penn Haven. | From Mauch Chunk. | From Hazleton** | From Upper Lehigh. | From Ashley and Sugar Notch |
|---|---|---|---|---|---|
| To ‡ Newark, N. J. (117 miles), via Central Railroad of New Jersey | 2 30 | 2 16 | 2 74 | 2 63 | 2 86 |
| ‡ Mauch Chunk, Pa., via Central Railroad of N. J. | 14 | .. | 56 | 47 | 70 |
| ‡ Philipsburg, N. J., (46 miles) | 86 | 72 | 1 21 | 1 19 | 1 42 |
| Elizabethp't, (114 m.) Pt. Johns., Hoboken & South Amboy, N. J., shipping and wharfage 35c. add. | 1 94 | 1 80 | 2 29 | 2 27 | 2 50 |
| High Bridge, N. J. | 2 40 | 1 95 | 2 80 | 2 54 | 2 72 |
| Elizabeth, Cranford, Westfield & Elizabethport, for consumption. | 2 30 | 2 16 | 2 63 | 2 63 | 2 86 |
| Jersey City, N. J., (121 miles) and New York, via L. V. RR. | 2 30 | 2 16 | 2 63 | 2 63 | 2 86 |
| Andover, via Delaware, Lackawanna and Western RR. | 3 30 | 3 10 | 3 70 | 3 69 | 3 99 |
| Trenton Somerset Junction and Greensburg, via P. RR. Belvidere Division | 2 65 | 2 45 | 3 05 | 3 04 | 3 34 |
| Trenton, (97 m.) for shipment, including shipping and wharfage | 2 11 | 1 95 | 2 45 | 2 46 | 2 76 |

From *Mauch Chunk* to *New York* (121 miles), (towing limits) and Jersey City† via Lehigh Valley RR..... $2 37
From *Mauch Chunk* to *Philadelphia* (93 m.) via L. V. and L. and S. RR. and North Penn. RR ..... 1 75
††From *Phillipsburg, N. J.* to *Hoboken* (84 m.) for shipment via Delaware. Lackawanna and Western RR., Morris and Essex Division ..... 1 08
From *Lackawanna Junction* to **Auburn, N. Y.*, (191 m.) for shipment, via Southern Central R R. in connection with Pa. and N. Y. R.R. ..... 2 53
From *Lackawanna Junction* to *Weedsport* (201 m.), for *Rochester and Charlotte* ..... 2 59
From *Lackawanna Junction* to *Sterling* for *Oswego, N. Y.*.. 2 62
‖ To this point for all places between Rochester and Buffalo the rate is ..... 2 53
* The rate to this point for Syracuse is..... 2 08
** Rates on line coal from Hazleton are 10c. per ton above these figures.

‡ The cost of unloading is to be added to these rates. No charge less than 40c. per ton will be made for any distance. Tolls from Mauch Chunk to Phillipsburg for way points will be $1 15 per ton.

§ Twenty cents per ton less when five cars at a time to one party. Provided that where the reduction makes the rate $1 a ton, or less, the rate will be $1.

† Transportation on Coal destined for re-shipment from this point is 20c. less than above rate.

†† The rate for consumption to this point is $1 80.

The distances in the above table are Computed from *Mauch Chunk*. From *Ashley* to *Mauch Chunk* the distance is 51 miles, and from *upper Lehigh*, 33 miles. From *Hazleton* 24 miles, and from *Penn Haven* 8 miles.

From *Wilkes-Barre* to *Perth Amboy* via the Lehigh Valley Railroad Company, the distance is 161 miles, and from *Mauch Chunk* it amounts to 106 miles.

## Freights.

Per ton of 2240 lb.

| PORTS. | From Philadelphia. | From Baltimore. | From Georgetown. | From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken. |
|---|---|---|---|---|
| Augusta, Me. | .... | .... | .... | .... |
| Albany | †80 | ... | ... | .... |
| Amesbury, Mass | .... | .... | .... | .... |
| Bangor, Me | .... | .... | .... | 1 00 |
| Bath, Me. | .... | 1 50 | 160–65 | 1 00 |
| Baltimore | .... | .... | .... | .... |
| Boston, Mass | 1 35@1 50 | 1 45@1 50 | 150–55 | 1 00 |
| Bridgeport, Ct | *70 | 1 40 | .... | 60 |
| Bristol, R. I. | .... | .... | .... | 85 |
| Cambridgeport, Mass. | §1 40@1 55 | .... | ... | 1 00 |
| Derby | .... | .... | .... | .... |
| Dighton | .... | .... | .... | .... |
| East Cambridge | §1 35@1 50 | .... | .... | §1 00 |
| Fall River | 1 25 | 1 40 | .... | 85 |
| Hackensack | *70 | .... | .... | .... |
| Hallowell, Me. | .... | .... | .... | .... |
| Hartford | *70 | .... | .... | .... |
| Hoboken | †70 | 1 20 | 1 25 | 40 |
| Hudson | .... | 1 20 | .... | .... |
| Jersey City | 70 | 1 20 | 1 25 | 40 |
| Lynn, Mass | .... | .... | .... | †1 00 |
| Middletown | .... | .... | .... | 1 00 |
| Mystic | .... | .... | .... | .... |
| Newark | .... | 1 50 | .... | .... |
| New Bedford | 1 30 | 1 40 | .... | 85 |
| Newburyport | .... | 1 60 | .... | 1 10 |
| New Haven | *70 | 1 40 | 1 30 | 60 |
| New London | 1 25 | 1 40 | .... | 75 |
| Newport | 1 25 | .... | .... | 85 |
| New York | 70† | 1 20 | 1 25 | 40 |
| Norwalk | 70‡ | 1 40 | .... | 60 |
| Norwich | 1 25‡ | .... | .... | 80 |
| Pawtucket | 1 75‡ | .... | .... | .... |
| Philadelphia | .... | .... | .... | .... |
| Portland | 1 30 | 1 50 | .... | 1 00 |
| Portsmouth, N. H. | 1 30@1 40 | 1 60 | .... | 1 10 |
| Providence | 1 25 | 1 40 | .... | 80 |
| Poughkeepsie, N. Y. | .... | .... | .... | .... |
| Rockport. | .... | .... | .... | .... |
| Saco | .... | .... | .... | .... |
| Sag Harbor | .... | .... | .... | 1 00 |
| Salem, Mass | 1 25@1 35 | 1 50 | .... | 1 00 |
| Salisbury Pt., Mass. | .... | .... | .... | ... |
| Stamford | *70 | .... | .... | 60 |
| Stonington | .... | .... | .... | .... |
| Taunton | .... | .... | .... | .... |
| Troy | †80 | .... | .... | .... |
| Warren, R. I. | .... | .... | .... | 85 |
| Wareham | .... | .... | .... | .... |
| Weymouth | .... | .... | .... | .... |

* And discharging and towing. † And discharging. ‡ And towing. § 30. per bridge extra.

## Freights on Bituminous Coals from the Mines to Tide Water Shipping Ports.

*From the Mines to Cumberland and State Line* (say an average of 20 miles), the legal charge is 2 cents per ton of 2240 lb. per mile.

*From State Line to Amboy* (346 miles) $4 per ton of 2000 lb. On coal shipped beyond this point there is a drawback of 75 cents per net ton.

*From Cumberland to Baltimore* (178 miles) $2.02 per ton of 2240 lb., or $1.80 per net ton (¼ cent per ton per mile for use of hoppers over C. & P. RR.).

*From Cumberland to Georgetown* (152 miles) by canal, $1.10. Tolls, 46 cents.

*From the Mines to Piedmont*, 4 cents per ton of 2240 lb. per mile on distances less than 4 miles, and 3 cents per ton per mile on distances over 4 miles, and 2 cents per ton per mile on distances over 10 miles.

*From Piedmont to Baltimore* (206 miles) $2.34 per ton of 2240 lb., or $2 08 per net ton.

*From Osceola to Greenwich, Phila.* (say 248 miles) per T. & C. RR., per ton bituminous coal of 2000 lb., less drawback of $1.46 $2.15; rate per gross ton, $2.60.

*From Osceola to South Amboy, N.J.*, (317 miles) per 2000 lb., $4.03, less drawback, $1.03; rate per net ton, $3; add 12 per cent. for gross ton, 36 cents, terminal expenses, shipping, 20 cents; rate per gross ton, $3.56.

## Towing.

Rates of Towing from New York to places on the *Hudson River*. Boats of 175 tons capacity and upwards. Per ton of 2240 lb.

| | cts. | | cts. |
|---|---|---|---|
| Yonkers | 9 | West Point & Cold Spring | 17 |
| Piermont & Dobbs' Ferry | 12 | Poughkeepsie | 20 |
| Nyack & Sing Sing | 15 | Rondout | 23 |
| Peekskill & Haverstraw | 16 | Hudson | 25 |

Rates for boats of 100 tons, per boat, are as follows :

| | cts. | | cts. |
|---|---|---|---|
| Manhattanville | 10 | Sing Sing & Peekskill | 20 |
| Yonkers | 15 | Newburg | 25 |
| Tarrytown | 18 | Poughkeepsie | 30 |

Special Rates will be made for Saugerties and Catskill.

*East River*, from the foot of Twenty-third street, to the following points, *and return*, per ton :

| | cts. | | cts. |
|---|---|---|---|
| New Haven & Norwalk | 33 | Middletown | 65 |
| Southport and Milford | 35 | Norwich | 67 |
| Branford | 45 | Hartford and Mystic | 75 |
| New London | 60 | Stonington | 75 |

Derby 33 cts. per ton and $50 per boat extra.

Bristol, Fall River, Providence, New Bedford, *Special rates*.

Boats having less than 200 tons, will be charged the same as if carrying that quantity.

* Rates of Towing from foot of 23d Street, E.R., to the following points.

Boats upwards of 150 tons capacity.

| | | | |
|---|---|---|---|
| 79th street 93d st. and Astoria, and return* | $12 | New Rochelle and Glen Cove | $45 |
| Mott Haven and Harlem† | 16 | Mamaroneck and Portchester | 60 |
| Flushing and Whitestone‡ | 25 | Greenwich and Darien | 70 |
| Little Neck and Port Washington | 40 | Round trip to Port Johnston | 14 |
| College Point and Bowery Bay | 25 | Round trip to Elizabethport | 16 |
| Roslyn | 50 | | |

From Hoboken to Limits (53d Street.) E. R., $5; N. R., $6.

Other Towing in the vicinity of New York, special rates :

* Small boats (less than 150 tons) to these points..... $10
† " " " " " " " " ..... 14
‡ " " " " " " " " ..... 20

Rates via the Hudson River are furnished to us by A. B. VALENTINE, No. 41 Jay Street. Rates via the East River are furnished by W. E. GLADWISH, No. 12 South Street.

*These rates are furnished to us by DAVID COX, 89 West St.

## IRON MARKET REVIEW.

### New York.

FRIDAY EVENING, April 21, 1876.

**American Pig.**—We are reported sales, in lots, of about 1,000 tons of No. 2 foundry Thomas iron; but, with this exception, we learn of no business of which particulars are given. It is reported that several thousand tons of iron, the quality of which has not transpired, have been sold in Philadelphia at an unprecedentedly low figure, but we are unable to learn the particulars. Some of the Lehigh companies are carrying very large stocks of iron and are increasing them. This has a constant tendency to weaken prices. The sale of forge iron, reported in our last, is said to have been made at $18, 6 months time without interest. We quote No. 1 foundry at $22; No. 2, $20; and forge, $18@$19.

**Scotch Pig.**—The demand for this article continues equal to importations, which are small. We note sales of 100 tons of Coltness, at $31.50; 200 tons Eglinton, at $28.50; and 100 tons Glengarnock, on private terms. We quote Eglinton at $28.50@$29; Coltness, $31.50@$32; Glengarnock, $30; and Gartsherrie, $31.

**Rails.**—We are reported a sale of 800 tons of Bethlehem iron rails at $45 delivered here. There is some inquiry, but the prospects are not encouraging. We quote iron rails at mills at $40@$43, and steel, at $60@$63.

**Old Rails.**—We learn of no sales and quote nominally at $23.

**Scrap.**—We are reported a sale of 200 tons of No. 1 wrought scrap, at $29, 30 days.

### Philadelphia Iron Trade.

Weekly report of the Philadelphia Iron Market, furnished by Messrs. JUSTICE, COX, JR., & CO., Iron Merchants, 333 Walnut street, Philadelphia. Week ending April 20, 1876.

Nothing new to report this week. Trade is moving along slowly. Buyers are evidently not disposed to anticipate future wants, and producers are making no special efforts to effect sales. Prices remain about the same as last week. We hear of some lots at a trifle lower than general quotations; but as consumers are only disposed to buy for immediate wants, no large sales are made at this time. There is a rumor of some of the large Lehigh companies going into a combination to advance prices, but in the present depressed condition of trade it would hardly work. We quote: No. 1, $22@$23.50; No. 2, $20 50@$21.50, with sales of about 1,200 tons all grades.

NEW RAILS.—Nothing to report. We quote $40@$45.

OLD RAILS.—We hear of a sale of 100 tons at $22.50. We quote $21.50@$23.50.

BAR IRON.—The orders are rather better this week than for the past week, but at no better price. We quote $2.35.

SCRAP.—Wrought scrap is very plenty, and dull of sale at lower prices. We quote: $22@$28, as to quality. Scrap cast can hardly be sold at any price. We quote: $12@$18.

### Baltimore. April 19, 1876.

Specially reported by Messrs. R. C. HOFFMAN & CO.

We have no change to note in the iron market since our last report. Prices remain unchanged, with sales at quotations.

| | | | |
|---|---|---|---|
| Baltimore Charcoal | $30@34 | Anthracite No. 3 | $20@21 00 |
| Virginia Charcoal | 28@34 | Mottled and White | 17@19 00 |
| Anthracite No. 1 | 23@24 | Charcoal C. B. Blooms | 65@67 50 |
| " No. 2 | 21@22 | Refined Blooms | 50@55 |

### Boston. April 20, 1876.

PIG has had a fair peddling trade at prices ranging from $24.50@26 for No. 1 according to the credit of the buyer. A reasonable report is upon the market that 200 tons No. 1 have been landed in a Lowell foundry yard at $24.25 net cash; in fact, New York parties are canvassing the interior and seeking to break our Boston market by just such prices as the above.

BAR moves along in a quiet steady way at $40, no one seems to be stocking up, and yet racks begin to look as though assortments were very much broken. Two mill men have been looking over the market the past week but as yet have not taken any orders. Boiler plates continue to sell in a steady way at 3c. and rivets at 5¼@5¾c. The pipe makers are understood to have advanced prices at their meeting on Tuesday ten per cent. again. Common sheet iron has had a slight start at 3¼@4⅛.

STEEL is quiet, the jobbing and manufacturing demand being excessively trivial. Prices are steady.—*Commercial Bulletin.*

### Chattanooga, Tenn. April 17, 1876.

Specially reported by J. F. JAMES pig iron broker, etc., 233 Market Street.

The usual four months' time on quotations below is allowed.

| | | | |
|---|---|---|---|
| Tenn. Ala. and Ga. | Charcoal, No. 1 foundry | $21@ | 22 |
| " " " " | No. 2 foundry | 20@ | 21 |
| " " " " | gray forge | 17@ | 18 |
| " and Georgia coke, | No. 1 foundry | 18@ | 19 |
| " " " | No. 2 foundry | 17@ | 18 |
| " " " | gray forge | 16@ | 17 |
| White and Mottled | | 14@ | — |
| Tennessee and Georgia cold-blast car wheel | | 24@ | 25 |
| Alabama " " | | 24@ | 25 |
| Old Rails | | cash | 21 50 |
| Cast Scrap | | " | 12 |
| Wrought Scrap | | " | 22 |

### Cincinnati. April 18, 1876.

Specially reported by Messrs. TRABER & AUBERT, commission merchants for the sale of pig iron, blooms, ore, etc.

Below will be found closing quotations of our pig iron market.

CHARCOAL.

| | | | |
|---|---|---|---|
| Hanging Rock, No. 1 Foundry | $25 00@ | .... | —4 mos |
| " No 2, " | 23 00@ | .... | —4 mos |
| " Mill | 21 00@ | 22 00 | —4 mos |
| Tennessee, No. 1, Foundry | 23 00@ | 24 00 | —4 mos |
| Tennessee, No. 2, " | 22 00@ | 23 00 | —4 mos |
| " Mill | 21 00@ | 22 00 | —4 mos |
| Missouri, No. 1, Foundry | @ | .... | —4 mos |

STONE COAL.

| | | | |
|---|---|---|---|
| Ohio, No. 1, Foundry | 22 00@ | 23 00 | —4 mos |
| " No. 2, " | 21 00@ | 22 00 | —4 mos |
| Ohio Mill | 20 00@ | 21 00 | —4 mos |
| Missouri, No. 1 Foundry | 27 00@ | .... | —4 mos |
| " No. 2, " | 26 00@ | .... | —4 mos |
| " Mill | 24 00@ | .... | —4 mos |

CAR-WHEEL.

| | | | |
|---|---|---|---|
| Hanging Rock, C. B | 40 00@ | 45 00 | —4 mos |
| Tennessee " | 30 00@ | 32 00 | —4 mos |
| Missouri " | 32 00@ | 35 00 | —4 mos |
| Alabama " | 30 00@ | 32 00 | —4 mos |

BLOOMS.

| | | | |
|---|---|---|---|
| Charcoal | 60 00@ | 70 00 | —cash |

SCRAP IRON.

| | | | |
|---|---|---|---|
| Cast | 50c.@ | 85 | —cash |
| Wrought | 1 00@ | 1 30 | —cash |

### Cleveland, Ohio. April 17, 1876.

Messrs. C. E. BINGHAM & CO., quote as follows :

Per gross ton, on four months' time. Subject to change in market. Discount for cash 4 per cent.

FOUNDRY IRON.

| | | | |
|---|---|---|---|
| No. 1, Lake Superior Charcoal | 27 50@ | .... | |
| No. 2, " " " | 26 50@ | .... | |
| No. 1, Anthracite | 25 00@ | .... | |
| No 2, " | 23 00@ | .... | |
| No. 1, Bituminous | 25 00@ | ... | |
| No. 2, " | 23 00@ | .... | |
| American Scotch, No. 1, Cherry Valley | 27 50@ | .... | |
| " " B—1, " " | 25 50@ | .... | |
| " " No. 2, " " | 24 50@ | .... | |
| No. 1, Massillon | 26 50@ | .... | |
| B—1, " | 24 50@ | .... | |
| No. 2, " | 23 50@ | .... | |

CAR WHEEL AND MALLEABLE IRON.

| | | | |
|---|---|---|---|
| No. 3 Lake Superior Charcoal | 26 50@ | .... | |
| No. 4 " " " | 27 50@ | .... | |
| Nos. 5 and 6 " | 27 50@ | .... | |

BESSEMER IRON.

| | | | |
|---|---|---|---|
| Nos. 1 and 2 Lake Superior Charcoal | 27 50@ | .... | |

FORGE IRON.

| | | | |
|---|---|---|---|
| No. 1, Gray | 22 00@ | .... | |
| White and Mottled | 21 00@ | .... | |

### Chicago. April 17, 1876.

Specially reported by Messrs. ROGERS & CO., dealers in Scotch and American pig iron.

The following are the present quotation for pig metal in our market :

| | | | |
|---|---|---|---|
| No. 1 Coltness | $38 00@ | .... | |
| No. 1 Gartsherrie | 38 00@ | .... | |
| No. 1 Summerlee | 37 00@ | .... | |
| No. 1 Glengarnock | 36 00@ | .... | |
| No. 1 Eglinton | 35 00@ | .... | |
| Warner's "American Scotch" | 30 00@ | .... | |
| Massilon No. 1 Foundry | 29 00@ | .... | |
| No. 1 Grand Tower Mo. ores (Bituminous) | 29 00@ | .... | |
| No. 2, " " " | 28 00@ | .... | |
| No. 1 Mill | 25 00@ | .... | |

| | | | |
|---|---|---|---|
| No. 1 Foundry, Ohio | 28 00@ | .... |
| No. 2 " " | 27 00@ | .... |
| No. 1 Hanging Rock (charcoal) | 28 00@ | .... |
| No. 2 " " " | 26 00@ | .... |
| Union "A" 1 (Anthracite) | 28 00@ | .... |
| Union "B" 1 (Anthracite) | 26 00@ | .... |
| No. 1 Lake Superior (charcoal) | 28 00@ | .... |
| No. 2 Lake Superior " | 26 00@ | .... |
| No. 3 Lake Superior " | 26 00@ | .... |
| No. 4 Lake Superior " | 28 00@ | .... |
| Bessemer Steel Rails | 65 00@ | .... |
| New Iron Rails | 45 00@ | .... |
| Old Rails | 28 00@ | .... |

**Louisville.** April 18, 1876.

Specially reported by Messrs. GEORGE H. HULL & Co.

The usual time, four mos., is allowed on the quotations below:

HOT BLAST—CHARCOAL.

| | |
|---|---|
| No. 1 Foundry, from Hanging Rock Ores | $25 00@26 00 |
| No. 2 " " " | 23 00@24 00 |
| No. 1, Mill, from " " | —@— |
| No. 1, Foundry, from Alabama, Georgia and Tennessee ores | 23 00@24 00 |
| No. 2, Foundry, from Ala., Geor'a and Tenn. ores | 22 00@23 00 |
| No. 1, Mill, from " " " " | 21 00@22 00 |

HOT BLAST—STONE COAL AND COKE.

| | |
|---|---|
| No. 1, Foundry, from Hanging Rock Ores | 23 00@24 00 |
| No. 2, " " " " " | 22 00@23 00 |
| No. 1, Mill, " " " " | 21 00@22 00 |
| No. 1, Foundry, from Ala. Ga. and Tenn. Ores. | 23 00@24 00 |
| No. 2, " " " " | 22 00@23 00 |
| No. 1, Mill, " " " " | 21 00@22 00 |
| No. 1 Foundry, from Missouri Ores | 24 00@25 00 |
| No. 2 " " " " | 24 00@25 00 |
| No. 1 Mill, from Missouri Ores | 25 00@26 00 |

COLD BLAST—CHARCOAL.

| | |
|---|---|
| Car Wheel from Hanging Rock Ores | 35 00@40 00 |
| " " Tennessee " | 28 00@30 00 |
| " " Alabama and Georgia Ores | 28 00@38 00 |
| " " Kentucky Ores | 28 00@40 00 |

**Milwaukee.** April 17, 1876.

Iron remains much the same—sales small.

| | per ton of 2,240 lb. |
|---|---|
| Frankfort L. S. Charcoal, No. 1 | $28 00 |
| " " " No. 2 | 27 00 |
| " " " No. 3, 4 & 5 | 25 00 |
| " " " No. 6 | 25 00 |
| Mil. Anthracite L. S., No. 1 | 27 00 |
| " " " No. 2 | 26 00 |
| Wisconsin Iron, No. 1 | 25 00 |
| Mahoning Valley Bit's No. 1 | 30 00 |
| " " " No. 2 | 28 00 |

**Pittsburgh, Pa.** April 19, 1876.

Specially reported by A. H. CHILDS, Esq.

The market is unchanged. Prices are steady and good grades of mill iron sell readily.

Foundry metal is somewhat dull and held with less firmness.

| | | |
|---|---|---|
| No 1. foundry | $24 00@25 00 | —4 mos |
| " 2. " | 22 50@24 00 | —4 mos |
| Gray forge | 21 00@22 50 | —4 mos |
| White and mottled | 18 00@20 00 | —4 mos |
| Warm blast charcoal | 22 00@25 00 | —4 mos |
| Cold b last " Western | 40 00@45 00 | —4 mos |

**Richmond, Va.** April 18, 1876.

Reported by ASA SNYDER, Esq.

The market for charcoal iron is firmer. The sales are largely in excess of the receipts. I note sales of over 400 tons this past week.

| | | | | |
|---|---|---|---|---|
| Virginia Cold Blast Charcoal Pig Iron | | | | $27 to $33 |
| " Warm " " " " | | | | 24 to 28 |
| " " " Coke " " | 1 X | | | 23 to 24 |
| " " " " " " | 2 X | | | 21 to 22 |
| " " " " " " | 3 | | | 20 to 21 |
| " Anthracite 1 X | | | | 24 to 23 |
| " " 2 X | | | | 22 to 22 |
| " " 3 | | | | 21 to 25 |

**San Francisco, Cal.**

From the *Commercial Herald*, April 13, 1876.

The stock of pig iron is large, with limited demand, causing low prices to prevail. The jobbing trade in manufactured iron shows some improvement in the demand, yet business in all departments is far from being animated. Tin plate is in large stock; this we quote at $8@8.50 for coke, $9@9.50 for charcoal; Sydney tin, 21@21½c. We note the purchase and re-sale of 600 tons English white pig iron (Claylane), all in market, upon private terms—100 tons sold at $40, and now held at $50; 100 tons Scotch pig iron, ex ship, sold at $32.

**St. Louis.** April 18, 1876.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

We note no change in our market since last report. Demand light and prices ruling very low.

We quote on four months' time:

| | | | |
|---|---|---|---|
| Mo. Stone Coal No. 1 Fy. | $25 50 | Massillon iron, A No 1 | 32@— |
| " " " 2 " | 25 50 | " " B " 1 | 31@— |
| " Gray Mill, | 24@25 | " " " 2 | 28@— |
| " Charcoal No. 1, Fdy. | 24 50 | Cold Bl. Car Wheel, Mo. | 30@33 |
| " " " 2, " | 24 50 | " " " " Tenn. | 30@33 |
| " " Gray Mill, | 23@24 | " " " " Ala. | 30@33 |
| Tenn. " No. 1, Fdy | 24@— | " " " " H. R. | 33@35 |
| " " " 2, " | 22@— | Mo. Charcoal Blooms | 60@70 |
| " "Gray Mill | 22.50@— | " Scrap " | 55@60 |
| Va. Coke, No. 1, Fdy. | 25@— | " " hammered | |
| " " " 2, " | 23@— | Billets | 75@80 |
| " "Gray Mill, | 23@— | Assorted Bar Iron | 2 35, 90days |
| H. R. Char. No. 1, Fdy. | 26@— | No. 1 Wrought Scrap | 1 10 ch. |
| " " " 2, " | 24@— | Heavy cast " | .95 " |
| " " Gray Mill, | 24@— | Light " | .60 " |

**Montreal.** April 14, 1876.

We continue to quote: Pig iron Eglinton and Clyde $21.00@21.50; Carnbroe $21.50@22; American $24@26; Summerlie and Calder $22.00@23.00; Langloan and Gartsherrie $22.00@23.00; Coltness $22.50@23.50; Hematite $30.00@31.00. Bar, per 100 lb., Scotch and Staffordshire, $2.20@2.25; best do., $2.50@2.60. Swedes and Norway $5.00@5.50; Lowmoor and Bowling, $6.50@7.00.—*Monetary Times.*

## Prices Paid for Silver Ores at Western Reduction Works.

GEORGETOWN, COLORADO, April 4, 1876.

Lead and copper remain as quoted in my last.

D. W. B.

| Yield of ore in silver. | Price per oz. silver, on basis of 25 per cent. lead.* | Yield of ore in silver. | Price per oz. silver, on basis of 25 per cent. lead. |
|---|---|---|---|
| oz. | cents. | oz. | cents. |
| 50 | 26 | 200 | 84 |
| 60 | 38 | 250 | 87 |
| 70 | 46 | 300 | 90 |
| 80 | 53 | 350 | 92 |
| 90 | 58 | 400 | 94 |
| 100 | 63 | 450 | 96 |
| 110 | 67 | 500 | 98 |
| 120 | 70 | 600 | 99 |
| 130 | 73 | 700 | 100 |
| 140 | 75 | 800 | 101 |
| 150 | 77 | 900 | 102 |
| 175 | 80 | 1000 | 103 |

* $1.00 paid for each per cent. over 25 per cent. lead.
* $1.50 paid for each per cent. of copper.
* Mill charges $4.00 per ton. Small lots $2.00

SALT LAKE CITY.—Ferruginous lead ores, $1.15 per oz. Ag., on a basis of 25 to 30 per cent. Pb. according to amount of silver in ore, under 30 oz., the basis would be 30 per cent. Pb. Siliceous ores. $1.00 to $1.05, oz. Ag., on a basis of 35 to 50 per cent. Pb. This varies according to the amount of sulphur in the ore, and whether roasting is required. 2 per cent. of silica to be taken up by iron

## METALS.

NEW YORK, FRIDAY EVENING, April 21, 1876.

There is but very little change to notice in the condition of the metal market. Purchases in all articles are confined to the immediate necessities of buyers; the market possessing no speculative features. Prices show but very little change from a week ago.

Mr. ERNEST W. S. MURRANT, of London, under date of April 7, says: With regard to the business in Metals during the past month, perhaps the least said will be soonest mended; it is, however, believed by the faithful, that we have very nearly arrived at the lowest prices that can be touched this year; while others point to a further drop all round as about the most likely thing to occur.

**Gold Coin.**—During the week under review, gold has ranged from 112⅞ to 113½ and closed 112⅞.

**Bullion.**—Fine silver bars show a decline in prices from those quoted a week ago. A Press disp atch quotes the London market to-day at 53½d., while dispatches to Banking Houses quote at 53¼d. The latter quotation we believe to be correct. Prices here have declined to $1.16½@$1.16¾ per oz. The San Francisco market is quoted at 11 per cent. discount. Fine gold bars are unchanged, and quoted as follows: this market par ($20.67 gold, per oz.) to ¼ per cent. premium. San Francisco, par; and London, 84/7¼d.

**Copper.**—The sales for the week have been from 400,000 to 500,000 lb. at 22½@22¾c. Manufacturers will not anticipate their wants, and are only buying to supply immediate necessities believing that the mild weather will permit new copper to reach this market at an earlier date than last year.

Mr. MURRANT says of copper: "Chili shows a rise of £1 since the beginning of March, this taking into consideration the drop of £4 per ton in Wallaroo in the same period, shows pretty well that bars are firmly held, and although they were sold to a limited extent at £75 10/ on one occasion, yet they close fully at £1 10/ above that price. The sales of the month have been considerable, at the above rates."

**Tin.**—The demand for pig tin is confined almost entirely to jobbing lots. Prices both here and in Europe are unchanged. We quote straits in large lots at 16½c. and in small lots at 16¾@17c.; L. & F. at 16½@16⅝c.; Refined at 17¼c.; and Banca at 22c., prices all gold.

MR. MURRANT says of Tin: "Foreign. There has been a drop in this article of 30s per ton during the past month, but no more disposition to purchase has manifested itself. A still lower price appears to be anticipated by those most interested, and the reason of this view is that heavy arrivals are expected for the next two months, the deliveries meanwhile being possibly not quite equal to those of the former months of this year. Should this be the case, the continued increase of Stock in this port will, no doubt, intensify the uneasy feeling which now exists among holders. The tranactions of the month have ranged from 71s. 6d. to 74s. 6d., according to the Report of the Committee, closing buyers at the lowest point."

**Tin Plates.**—There is only a very limited business doing in these. Quotations in gold, per box as follows: Charcoal tins, $7.12½@7.37½, and terne $6.75@7; coke tins, $6.25@6.37½, and ternes, $6@6.12½.

**Lead.**—The sales for the week have amounted to about 200 tons at 6.25c.@6.35c. go d. The present quotations are about 6.25c.@6.30. gold. This weakness in prices has been brought about by a lack of demand.

**Spelter and Zinc.**—Domestic spelter is very quiet, with the Combination still asking 8c. currency, 30 days, although outside lots are offering at a less figure. Foreign W. H. is quoted at 7·30c. gold. Sheet zinc is quiet at 8¼c.@8⅞c. gold.

**Antimony** is quiet but firm at 16c.

**Quicksilver.**—By cable, to-day, quicksilver is quoted in London at £10 per flask. In this city the asking price is 61c.@62c. gold, per lb., and in San Francisco, 59c.@60c. gold.

## FINANCIAL.

**New York Stocks.**

FRIDAY, April 21, 1876.

A notable decline has occurred in our list of the coal carrying stocks as compared with our last, and it is thought by many that the market for these has not touched bottom yet, for it is generally believed that sound policy if not necessity will cause most of these companies to limit their dividends in the future to lower rates than the stockholders have been in the habit of receiving.

*Delaware and Hudson Canal Company's* stocks shows unusual fluctuations, ranging from 118¼ to 111 during the past two weeks, closing at 111 which is a decline of $4.25 per share from our quotation of a week ago.

*Delaware, Lackawanna and Western RR.*—The break in this stock is very marked. Sales have amounted to over 6,000 shares selling down to 108 per share, seller 60 days, and finally closing at 110½, being a decline of nearly $7 per share compared with the price recorded in our issue of the 15th inst. This is the lowest figure reached by this stock since February 1875 when it touched 108⅝.

*N. J. Central RR.* stock still continues its downward movement, and has reached the lowest price we have recorded since Dec., 1873, when it was quoted at 95. Our closing quotation to-day places it at 98¼, a recovery of 1¾ from the lowest price reached during the week, and a decline of nearly $2 per share, compared with our last. Sales of this stock for the week, will aggregate nearly 10,000 shares. The annual meeting of the stockholders of this company, to elect nine directors for the year next ensuing, will be held at their office in Jersey City, on the 5th of May.

*Consolidation Coal Company.*—The effort noted in our last, to keep up the stock of this company has failed to impress investors, and it has shared in the general decline of the market, falling during the week, $2½ per share, and closing to-day at $40. The sales amounted to 1,400 shares.

*St. Louis and Iron Mountain RR.* is lower and moderately active, and we note a decline of $2 per share between the extreme limits, with a slight recovery toward the close, final sales being made at 20½.

*Mariposa Land and Mining Company.*—This stock has sold to the extent of 200 shares at from 7 to 7½ per share. The tunnel at last advices was 1,410 feet long. The lode has been explored for some 600 feet, and found to contain ore yielding from one to thirty dollars per ton. Further exploration has been stopped, and a double-track crosscut is to be run into the ore body.

*Union Mining* stock has sold in the Board to the amount of 2,450 shares at from 1⅜ to 1⅝.

*St. Louis, Alton and Terre Haute Railroad.*—From the annual report of this company for the year 1875, we take the following comparison of the coal business over the Belleville Bran h and Extension for the years 1874 and 1875:

| | 1874. | 1875. | Increase. |
|---|---|---|---|
| Car loads of coal | 27,319 | 28,885 | 1,566 |
| Tons | 312,443 | 352,640 | 40,197 |
| Tons one mile | 8,009,963 | 8,757.103 | 747,140 |
| Receipts | $211,003.71 | $233,218.07 | $21,314.36 |

*The Ironton, Ohio, Iron and Steel Company* have made the following statement to their creditors for the purpose of procuring an extension. Their clean resources are set down at $338 813.11, and liabilities at $262,681.35. In the statement, the mill, etc., which cost $172,686.48 in 1873, is put down at $125,000, and the furnace, which cost $136,000, is estimated at $100,000. The mill and furnace is considered good property, and capable of making money whenever any institution of the kind can run and save anything. The proposition of the directors is to issue notes secured by first mortgage bonds, for two to five years, with eight per cent. interest.

**Quotations and Sales of Stocks and Bonds,**

For the week ending April 21, 1876.

STOCKS.

| | Highest | Lowest | Closing | Shares sold. |
|---|---|---|---|---|
| Pennsylvania Coal Co | — | — | *265 | — |
| Consolidation Coal Co | 42¼ | 40 | 40 | 1400 |
| Spring Mt. Coal Co | — | — | 50 | — |
| American Coal Co | — | — | 50 | — |
| Maryland Coal Co | — | — | 15 | — |
| Del., Lack., and West. RR. Co | 115 | 108† | 110½ | 6168 |
| New Jersey Central RR. Co | 100½ | 96½ | 98¾ | 9685 |
| Delaware and Hudson Canal Co | 115½ | 111 | 111 | 100 |
| Quicksilver Mining Co. pref'd | — | — | 22¾ | 583 |
| " " " Common | — | — | 17 | — |
| Mariposa Land & Min. Co. various | 7¼ | 7 | 7⅛ | 200 |
| St. Louis & Iron Mountain RR | 21½ | 19½ | 20⅜ | 330 |
| Lehigh & Wilkes-Barre Coal Co | — | — | *40 | — |
| Total Shares sold | | | | 18468 |
| Sales for the week previous | | | | 12829 |
| Increase | | | | 5639 |

* These are nominal quotations.
† Seller 60 days.

BONDS.

| | Sales. | Price |
|---|---|---|
| Ches. & O. R. R. 6s, 1st. cou. on | 1,000 | — @ 32 |
| " " " ex coupon | — | — @ — |
| Central RR. of N. J. 1st Mtg. N | 1,000 | @113 |
| " " " 1st Cons. | 3,000 | @108⅛ |
| " " " Convt. | 15,000 | @108 |
| Del. and H. Canal, 1st Mtg. 91 | 15,000 | 110⅛@111⅛ |
| " " 78, '84 | 19,000 | 109⅛@110 |
| " " Reg. '94 | 14,000 | @109 |
| Del., Lack. & W. R. R., 7s, conv. | 2,000 | @114¼ |
| " " " " 2d Mtg. | — | @ — |
| St. Louis & Iron Mount'n 1st Mtg | 5,000 | @100½ |
| St. Louis & Iron M'tn, 2d Mtg. | — | @ — |
| Lehigh & Wilkes-Barre Cons. | 19,000 | 94⅝@ 95 |
| Total Sales | $94,000 | |

Closing quotations, in the absence of sales, represent the latest prices bid.

### Philadelphia Stocks.

PHILADELPHIA, April 21, 1876.

With the exception of an unchanged condition in the shares of the Lehigh Valley Railroad Company, the Philadelphia stock market is lower, the dealings for the week have been very large, aggregating nearly 200,000 shares, of which 127,600, represents transactions in the Pennsylvania Railroad stock. No doubt a large proportion of these sales were on speculative account, the records of the clearing house in no instance showing over 7,000 shares as the actual transfers of stock for a single day. The stock closed steady at a decline of nearly two points from the final price in our last.

*Philadelphia and Reading Railroad.* - This stock, in sympathy with the general tendency of the market, is down $2 per share, with reported transactions of nearly 60,000 shares for the week, actual sales, however, will probably amount to about 10,000 shares.

*Lehigh Coal and Navigation Company.*—This stock has sold to the extent of 4,628 shares, closing at a decline of ⅜.

*Auction Sales of Stocks and Bonds* for the week, have been as follows:

*Pennsylvania Salt Mfg. Company*, 26 shares at $69 to $69¼ per share.

*Pennsylvania Steel Company*, 100 shares at $70 per share.

*Chesapeake and Delaware Canal Company*, 50 shares at $18 per share.

*Susquehanna Canal Company.*—$3,000 6 per cent mtg. coupon bonds at 73 per cent.

*Bonds.*—The transactions in these have amounted to a little over $50,000, at fairly maintained prices.

*Shamokin Valley and Pottsville Railroad Company.*—The annual meeting of the stockholders of this company, will be held May 1.

### Quotations and Sales of Stocks and Bonds,

For the week ending April 20, 1876.

STOCKS.

| | Highest | Lowest | Closing | Shr's |
|---|---|---|---|---|
| Lehigh Valley RR. Co | 61⅛ | 60¾ | 61 | 954 |
| Pennsylvania RR. | 56⅛ | 54⅛ | 54⅞ | 127000 |
| Reading RR. | 46⅜ | 44⅛ | 44⅛ | 58200 |
| Lehigh Coal and Nav. Co | 49¼ | 48⅜ | 48¾ | 4628 |
| Penn. Canal | — | — | *9 | — |
| Buck Mountain Coal Co. | — | — | *10 | — |
| Fulton Coal Co. | — | — | *3½ | — |
| Locust Mountain Coal Co | — | — | — | — |
| Westmoreland Coal Co. | — | — | *84 | — |
| St. Nicholas Coal Co. | — | — | *1 | — |
| Cambria Iron Co. | — | — | 16⅛ | — |
| Crane Iron Co. | — | — | *46 | — |
| Emaus Iron Co | — | — | — | — |
| Pennsylvania Salt Manufact. Co. | 69 | 68¼ | 69 | 42 |
| Total shares sold | | | | 191,424 |
| Sales for the week previous | | | | 83,219 |
| Increase | | | | 108,205 |

* These quotations are nominal.

BONDS.

| | Sales. | Price |
|---|---|---|
| H and B. T. RR. 1st mortgage, 7s | — | — @109 |
| " " " 2d " " | — | — @104 |
| " " " 3d " cons | — | — @ 55 |
| Lehigh Valley RR. Con. mtg. 6s, Reg | 3,000 | 100¾@101 |
| " " 7s, 1910 | 7,000 | — @110¾ |
| " " 6s Reg. and Cou | 1,000 | — @107 |
| Pennsylvania RR., 1st mtge. 6s | 5,000 | — @105 |
| " gen. " cou. 1910 | — | — @105 |
| " " gen. " 6s, reg | — | — @105¼ |
| " " Cons. M. 6s reg | — | — @100 |
| Phil. & Reading RR. 7s '93 | 1,000 | — @107¾ |
| " " G. M. 7s, cou | 4,000 | — @107 |
| " " " " Deb. 6s | 1,000 | — @ 82 |
| " " new convertible 7s | 9,400 | 103¾@100¾ |
| " " mtg. 6s '80 | 6,500 | — @104 |
| Phil. & Reading C. & I. Co. Deb. 7s | — | — @ 81⅛ |
| " " Swatara tract | — | — @ 87 |
| Lehigh Coal & Nav. Co., 6s '84 | 523 | — @103 |
| " " " RR. 6s, '97 | 1,000 | — @104⅛ |
| " " " gen. m. 7s Reg | 3,000 | — @105 |
| " " " Convt. gold, '97 | 9,000 | 104¼@105 |
| Penn. Canal, 6s | 2,000 | — @ 76 |
| Penn. and N. Y. Canal, 7s | 3,000 | 109 @109¾ |
| Ches. and Del. Canal, 6s | — | — @ 86½ |
| Susquehanna Canal, 6s | — | — @ 77 |
| Delaware Division Canal, 6s | — | — @ 99¾ |
| Susquehanna Coal Co. 7s | — | — @ 85 |
| Buck. Mount Coal Co. 6s | — | — @ 97⅛ |
| Penn. Gas Coal Co. 6s | — | — @100¼ |
| Total amount of sales | $56,423 | |

Closing quotations, in the absence of sales, represent the latest prices bid.

† Asked.

### Gold and Silver Stocks.

NEW YORK, FRIDAY EVENING, April 21, 1876.

The San Francisco reports show the usual fluctuations in the prices of stocks. In a few instances there have been advances, as, for example, Alpha Consolidated that improved $12, and Mexican which has advanced $4 during the week. The majority of the list shows a decline, in the case of Chollar-Potosi of $27 per share. Consolidated Virginia and California also show a slight decline. There is no necessary connection between the ups and downs of the San Francisco mining stocks and the richness of the mines, the value of the stock being dependent much more upon the solidity of the bulls and bears than upon the width and richness of the vein. The extraction of ore from the Consolidated Virginia has decreased very materially, but this may be owing to a desire to make a very startling report next month, possibly the ore as mined is being accumulated in the mine ready to be taken out in May. The March product was $3,636,456, of which $467,136 was expenses, and $2,089,320 was carried over to the surplus fund. It is generally supposed the Bonanza mines will make a vigorous effort to bring their product during May up to ten million dollars.

The C. and C. shaft at last report was down 1193-feet "*California* furnishes only 200 tons of ore per day for the new mill, but will increase the amount very soon. Winze No. 6 from the 1,500 ft. level is down 113 feet and in high grade ore.

*Northern Belle* is developing into a big mine. For March account they extracted $135,100. A dividend of $1 per share ($50,000) has been declared, showing an aggregate disbursement in this shape of $550,000.

*Chollar* has again advanced. They took out 380½ tons of ore the past week, valued at $35 per ton.

The Pioche *Record* says a rich strike has been made in the Raymond and Ely mine.

The *Norman* mine is said to be looking well and some of the ore recently assayed yielded $285, to the ton.

*Incorporations.*—The following companies have filed certificates of incorporation in the County Clerk's office at San Francisco:

*Lafayette Cons. M. Co.*—Location: Virginia district, Nev. Capital stock, $6,000,000.

*Manhattan Ore Treating Co.*—Object: Manufacturing machinery invented by CHAS. F. SECOR, appertaining to the process of treating ores, Capital stock, $25,000.

*South Pacific Coast RR. Co.*—Capital stock $1,000,000, in 10,000 shares. Object: Construct, conduct and maintain a railroad from a point on the Bay of San Francisco, at Potrero point, otherwise known as Dumbarton point, in San Mateo county, through the counties of San Francisco, San Mateo, Santa Clara and Santa Cruz, on the most practicable route, to the town of Santa Cruz, with intermediate branch lines to Saratoga and New Almaden from such points on said railroad as may be designated by the Board of Directors. The estimated length of said railroad, with its intermediate branches, is about 55 miles. The term of the incorporation is fixed at 50 years.

*Resumption M. Co.*—Location, Storey county, Nevada. Capital stock, $5,000,000.

*Consolidated Imperial M. Co.*—Location, Storey county, Nevada. Capital, $10,000,000, divided into shares of $100.

*Ely G. & S. M. Co.*—Location, Lincoln mining district, Nevada. Capital, $5,000,000, in shares of $100.

*Truckee M. Co.*—Location, Storey county, Nevada. Capital stock, $10,000,000.

*Juno S. M. Co.*—Location, Nevada county. Capital stock, $5,000,000.

*Pitt River M. Co.*—Location, Copper City district, Shasta county. Capital stock, $10,000,000.

*East Utah S. M. Co.*—Location, Washoe. Capital stock, $10,000,000.

*Monitor Cons. M. Co.*—Location, Columbus district, Nevada. Capital stock, $5,000,000.

*Lafayette G. and S. M. Co.*—Capital stock, $4,000,000.

*Lime Rock RR. Co.*—Object: To run a narrow gauge railroad from Montery bay in Santa Cruz, to a point in the Santa Cruz mountains, with a branch, the whole length of the road being 10 miles. Capital stock is $200,000, of which $10,000 has been subscribed.

*Pacific Sulphur Co.*—Capital $5 000,000, in shares of $100 each. The principal place of business will be in San Francisco.

*The Star Gold and Silver Mining Company*—to operate in the State of California. Capital, $1,000,000, in shares of $10 each.

*The Conley and Gowell Consolidated Mining Company*—to operate in the State of California. Capital, 10,000,000, in shares of $100 each. The principal place of business will be in San Francisco.

*Inyo Lumber and Coal Comyany*—to carry on the business of manufacturing lumber and charcoal, etc., on Owen's Lake and River. Capital, $500,000, in shares of $100 each. The principal place of business will be in San Francisco.

*The San Francisco Stock and Exchange Board* have declared their second monthly dividend of $150. The falling off since last month, when the dividend amounted to $200, is more apparent than real, for there was then a large surplus on hand, whereas the present payment, aggregating $15,000, comes from *bona fide* current receipts. The affairs of the Board were never in a more prosperous condition than at present, and the presumption is that these dividends will now become regular monthly institutions.

*Empire* (G. V.) declared a dividend of 50 cents per share.

*Assessments*, with dates when delinquent: Beg. Belcher, $5, May 16th; Crown Point, $1, May 10th.

QUOTATIONS:

| | No. of feet on Vein. | No. of shares. | April 13. | April 20. |
|---|---|---|---|---|
| Sierra Nevada | 3,300 | 100,000 | $25 | $22 |
| Union Consol'd. | 600 | 100,000 | 17 | 19 |
| Mexican. | 600 | 108,000 | 38 | 42 |
| Ophir. | 675 | 108,000 | 67 | 66 |
| California | 600 | 540,000 | 83 | 84 |
| Consol'd. Virginia | 710 | 540,000 | 80 | 78 |
| Best & Belcher | 540 | 100,800 | 58 | 54 |
| Gould & Curry | 612 | 108,000 | 21 | 18 |
| Savage | 771 | 112,000 | 19 | 17 |
| Hale & Norcross. | 400 | 16,000 | 70 | 70 |
| Chollar Potosi | 1,400 | 28,000 | 147 | 120 |
| Alpha Consol'd. | 306 | 30,000 | 63 | 75 |
| Imperial | 184 | 100,000 | 18 | 6* |
| Yellow Jacket | 57 | 120,000 | 35 | 34 |
| Kentuck | 95 | 30,000 | 17 | 17 |
| Crown Point | 541 | 100,000 | 23 | 21 |
| Belcher | 1,040 | 104,000 | — | 31 |
| Overman | 1,200 | 38,400 | 82 | 77 |
| Caledonia | 2,188 | 100,000 | 13 | 11 |
| Justice | 2,100 | 105,000 | 31 | 30 |
| Raymond & Ely. | 5,000 | 30,000 | 17 | 16 |
| Meadow Valley | 4,400 | 60,000 | 2 | 2 |
| Eureka Consolid. | .... | 50,000 | 13 | 13 |
| Eureka G. V. | 1,680 | 20,000 | 3 | 3 |
| Silver Hill. | 5,400 | 54,000 | 10 | 9 |
| Julia. | 3,000 | 110,000 | 15 | 15 |

* New stock 3 shares for one.

### Copper Stocks.

Specially reported by Messrs. WILSON W. FAY & Co., Bankers and Brokers, Room 7 Traveller Building, 31 State Street, Boston.

BOSTON, THURSDAY EVENING, April 20, 1876.

The Copper market shows very little change, the sales being very light. Allouez 18, bid. Calumet has advanced from 172, April 12, to 174¾ bid April 17, since then it has declined to 174, and closes at that, asked. Duncan Silver, in moderate demand, by the inside parties, who evidently would like to see the stock go higher. Madison 25 to 30, with sales during the week at both figures. Quincy is stronger at 41 bid, with sales as high as 41.25. National, 2.12½ bid, with private sale at 2.25. The following have been the sales during the week: 44 Duncan Silver, at 1 50; 122 Quincy, from 40.50 to 41.25; 135 Franklin, from 13.62½ to 13.50; 30 Calumet at 174.

| DESCRIPTION. | Par Value. | No. of Shares. | CLOSING. Bid. | CLOSING. Asked. |
|---|---|---|---|---|
| Allouez | $50 | 20,000 | $18 00 | $19 00 |
| Calumet and Hecla | 25 | 80,000 | 172 00 | 174 00 |
| Central | 25 | 20,000 | 30 00 | 30 50 |
| Copper Falls | 25 | 20,000 | 2 00 | 2 25 |
| Dana | 25 | 20,000 | 10 | 12½ |
| Franklin | 25 | 20,000 | 13 00 | 13 50 |
| Humboldt | 25 | 20,000 | 13 | 15 |
| Madison | 25 | 20,000 | 25 | 30 |
| Mesnard | 25 | 20,000 | 55 | 62 |
| Minnesota | 25 | 20,000 | 1 75 | 2 00 |
| National | 15 | 20,000 | 2 12½ | 2 37½ |
| Osceola | 25 | 40,000 | 18 00 | 20 00 |
| Petherick | 25 | 20,000 | 60 | 65 |
| Pewabic | 25 | 20,000 | 4 50 | 5 00 |
| Phenix | 25 | 20,000 | 12 00 | 13 00 |
| Quincy | 25 | 20,000 | 41 00 | 41 25 |
| Ridge | 25 | 20,000 | 5 00 | 5 25 |
| Rockland | 25 | 20,000 | 25 | 30 |
| International Silver | 20 | 60,000 | 15 | 18 |
| Star | 25 | 20,000 | 5 | 8 |
| Superior | 25 | 20,000 | 10 | 15 |
| Duncan Silver | 20 | 60,000 | 1 55 | 1 62 |

### Gas Stocks.

NEW YORK, April 21, 1876.

Gas Stocks are quiet and unchanged, no transactions are reported, holders who are generally persons of means apparently, preferring to hold, with the hope of getting better prices and buyers seeming generally unwilling to purchase even at present rates.

*Bids for Lighting the Streets of New York*, were opened yesterday by the Commissioner of Public Works for the supply of gas, repairing of lamps, &c., for the nine months from May 1 to December 31, 1876. The prices at which the various companies offered to supply the gas for each lamp for this period are as follows:—Manhattan Company, $14; Metropolitan, $20.12; New York, $14; Harlem, $24; Mutual $13.75. The Mutual being the lowest bidder will, probably, receive the contract for that portion of the city covered by their gas mains. All the companies fixed the price for fitting up lampposts at $10, and they all bid $10 per lamp for refitting. The Harlem and Metropolitan companies will also supply a portion of the gas on the line of their mains. Connections must be made with about 3,000 lamps under the acceptances of these bids.

The prices paid per lamp for the first four months, of the present year were: Mutual, $12; New York, $9; Manhattan, $9; Harlem, January, $4.08; February, $3.41; March, $3.45; April, $2.97. Metropolitan Gas Light Company contract price for the balance of the year, $14.

The New York Gaslight Company proposed to light the streets south of Canal and Grand street, the Manhattan Company, the streets between Grand and Thirty-fourth streets the Metropolitan Company, the streets from Thirty-fourth to Seventy-ninth street, the Harlem Company, all lamps above Seventy-ninth street to Spuyten Duyvil Creek and Harlem River, and the Mutual Gaslight Company, to light Union, Madison, Tompkins, Washington, Jackson, and Cooper Institute squares, and the Worth and Washington monuments, for $10 per lamp.

*Sales of Eastern Gas Stocks*, for the week are reported to us as follows:

*Newton and Watertown, Mass, Gas Co.*, small transactions at 124½.

*Charlestown, Mass., Gas Co.*, 45 shares at from 75 to 75¼.

*Boston, Gas Co.*, 8 shares at 795.

*Citizens' Gas Co. of Wakefield, Mass.*, 10 shares at 58.

*Malden and Melrose Gas Co.*, 13 shares at 99. This Company has reduced the price of Gas from $4.00 to $3.50 per thousand.

*People's Gas Co.*, of Baltimore, Md., has recently sold to the extent of 100 shares at from 25¼ to 25⅝ per share.

*San Francisco Gas Co.*—This company has declared its regular monthly dividend of ¾ per cent. aggregating $75,000. We note recent sales of this stock amounting to 100 shares at par. For gas used in the *Bulletin* and *Call* newspaper offices, the proprietors paid last year about $5,446,70, these and other San Francisco papers have taken up the subject and are demanding cheaper gas.

*Vineland, N. J.*—A contract has been entered into with a Boston firm to construct works and supply this place with gas for $3 50 per thousand feet, with a proviso that pledges are made that at least 200 parties will have the gas introduced in their premises.

*La Salle and Peru, Ill.*—The Common Council of the city of Peru have resolved to burn no more gas for the illumination of the streets at $4 a thousand feet, and many of the citizens of both La Salle and Peru have discontinued its use as a measure of practical economy.

*South Wheeling Gas Works.*—The difficulty between the proprietors of these works and their employees, the result of which was a strike, is about over, five shops being at work.

*The Consumer's Gas Company of Toronto, Ont.*, has asked for tenders, for the supply of 11,000 tons (of 2,000

lb.) of newly mined bituminous gas coal; to be delivered in the company's coal sheds, free of all charges between June 15 and Oct. 1, 1876. The coal to be paid for at the Gas Company's weights. The kind of coal offered must be specified. Tenders to be made on a gold basis.

The following list of Companies in New York and vicinity are corrected weekly by GEORGE H. PRENTISS, Broker and Dealer in Gas Stocks, No. 30 Broad st., N. Y.
*Quotations "bid" and "asked" of New York City and Vicinity Gas Companies are on the $100 of stock and not on one share.*

| Companies in New York and Vicinity | Cap. Stk. | Par. | last Divid. | When Paid. | Bid. | Askd. |
|---|---|---|---|---|---|---|
| | | | pr.c | | | |
| Mutual, N. Y..... | $5,000,000 | $ 100 | 2½ | Jan. '76 | 108 | 108½ |
| " " Bonds | 900,00 | 1,000 | ‡3½ | Feb. '76 | 105 | |
| NewYork, " ..... | 4,000,000 | | 5 | Jan. '76 | 136 | 140 |
| Metropol. " ..... | 2,500,000 | 100 | 5 | Mar. '76 | 145 | 150 |
| " " Certf. | 1,000,000 | ... | 3½ | " " | 102 | 103½ |
| " " Bonds | 500,000 | 1,000 | 3½ | Jan. " | 105 | |
| Harlem " .... | 1.850,000 | 50 | 4 | Feb. '76 | 115 | 120 |
| Manhattan" .. | 4,000,000 | 50 | 10 | Jan. " | 250 | 255 |
| Brooklyn, B'klyn . | 2,000,000 | 25 | 5 | Nov. '75 | 190 | 195 |
| Nassau " .. | 1,000,000 | 20 | 4 | Jan. '76 | 90 | 95 |
| " "Certf. | 700.000 | 1,000 | 3½ | Nov. '76 | 95 | 98 |
| People's " | 1,000,000 | 10 | 3½ | Jan. '76 | 60 | 70 |
| " "Certf. | 300,000 | 1,000 | 3½ | Jan. '76 | 85 | 86 |
| " " Bds | 325,000 | .... | 3½ | Feb. " | | 95 |
| Metropol. " .... | 1,000,000 | 10 | 3½ | Nov. '75 | 70 | 75 |
| Wmsburgh " ... | 1,000,000 | 50 | 5 | Jan. '76 | 120 | 125 |
| " "Certf. | 1,000,000 | .... | 3½ | Jan. " | 98 | 100 |
| Citizen's " .... | 1,200,000 | 20 | 2½ | Jan. '76 | 95 | 100 |
| " "Certf. | 320,000 | 1,000 | 3½ | April " | 99 | 101 |
| J. C. N.J..... | 386,000 | 20 | 5 | July,'75 | 160 | 170 |
| Centl. Westch. N.Y. | 466,000 | 50 | 4 | July. " | 95 | 100 |

‡ Gold..

| Companies out of Town.* | Cap. Stk. | Par | Bid | Askd |
|---|---|---|---|---|
| People's " " of J. C..... | | | 125 | 135 |
| ¶Citizen's G. L. Co., New'k, N.J. | 1,095,000 | 50 | 85 | 90 |
| Hempstead" " L. I., N.Y. | 40,000 | 100 | | 100 |
| Jamaica, " " " | 25.000 | 100 | | 100 |
| Richmond Co., S. I. " | 300,000 | | 100 | 105 |
| Citizens', Rochester, " | | 100 | 60 | 68 |
| Rochester Gas Co., " | | 100 | 50 | |
| ‖People's G. L. Co. Albany," | 1,000,000 | 100 | | 40 |
| §Mutual " Buffalo " | 750,000 | 100 | 45 | 55 |
| Mutual " Detroit Mich. | | 50 | 18 | |
| TroyG. L. Co., Troy, N. Y..... | | | 108 | |
| Brockport, N. Y., G. L. Co. .... | 25,000 | 100 | 60 | 80 |
| †Baltimore G. L. Co., Balt., Md | 2,000,000 | 100 | 178 | 179 |
| St. Louis G. L. Co., St. Louis, Mo | 600,000 | | 110 | 130 |
| People's G. L. Co., Balt., Md | 2,000,000 | 25 | 25¼ | 25⅝ |
| Hannibal G. L. Co., Hanni., Mo. | 100,000 | 100 | 95 | 100 |
| La Clede, St. Louis, Mo ..... | 1,200,000 | 100 | 110 | 115 |
| Lewiston G. L. Co., Lewis., Me | 400,000 | 100 | 33 | |
| Chicago G. L. Co., Chicago, Ill. | 2,000,000 | 100 | 140 | |
| Jacksonville, Ill..... | 120,000 | 100 | 82 | |
| ‡Lima, Ohio..... | 60.000 | 100 | 10 | |
| Derby G. L. Co., Derby, Conn.. | 160,000 | 100 | 60 | 80 |
| Woonskt G. L. Co.Woonskt,R.I. | 150,000 | 100 | 100 | |
| Fort Wayne G. L. Co. F. W.,Ind | | 100 | 90 | 100 |
| North. LibertiesG. L. Co. Phila. | | 25 | 29 | |
| Wilkes-Barre G. L. Co W. B. Pa. | | 50 | 70 | |
| Washington G. L. Co., Phila.... | | | 42 | 43 |
| Pottsville, Pa. Gas Co.... .... | | 50 | 40¾ | |
| Portland G. L. Co. Portland, Me | 350,000 | 50 | 72 | 75 |
| Hartford G. L. Co., Hartford,Ct | 700,000 | 25 | 41 | |
| Boston G. L. Co., Boston, Mass. | 2,500,000 | 500 | 794 | 796 |
| East Boston, Mass ..... | | 25 | 132 | |
| Chelsea G. L. Co. Chelsea, " | 300,000 | | 139 | |
| Cambridge G. L. Co., Cam., " | 700,000 | | 132¾ | |
| Louisville G. L. Co., Louis., Ky. | | | 127 | |
| Cincinnati G. L. Co , Cincin, O., | | | | 200 |
| St. Louis G. L. Co ..... | | 50 | | 160 |
| Carondelet G. L. Co., Mo... | | 50 | | 64 |
| S. F. G.L. Co. San Francisco,Cal | 10,000,000 | 100 | 99¼ | 99¾ |
| City G. L. Co. Montreal, Can.... | 1,440,000 | 40 | 165¾ | 166½ |
| Consumers G. L (old.) Tor., Ont | 600,000 | 50 | 132 | |
| Hamilton G. L. Co., Ont..... | 150,000 | 40 | 112½ | |
| Halifax G. L. Co., Halifax, N.S.. | 400,000 | 40 | 146½ | |

* These quotations represent the latest obtainable prices at which sales were made.

† This Company has issued $1,000,000 in certificates in addition to their stock indebtedness, on which they pay interest at the rate of 6 per cent. gold.

‡ This Company has $30,000 in bonds outstanding.

§ $700,000 represents the bonded indebtedness of this Company; these bonds are quoted at from 80 to 85.

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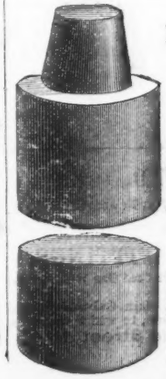

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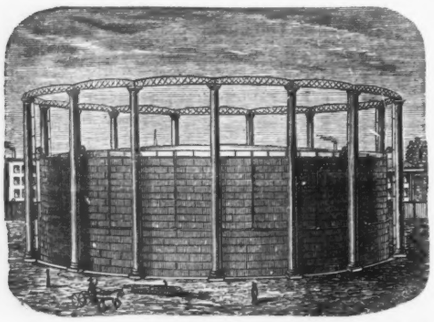

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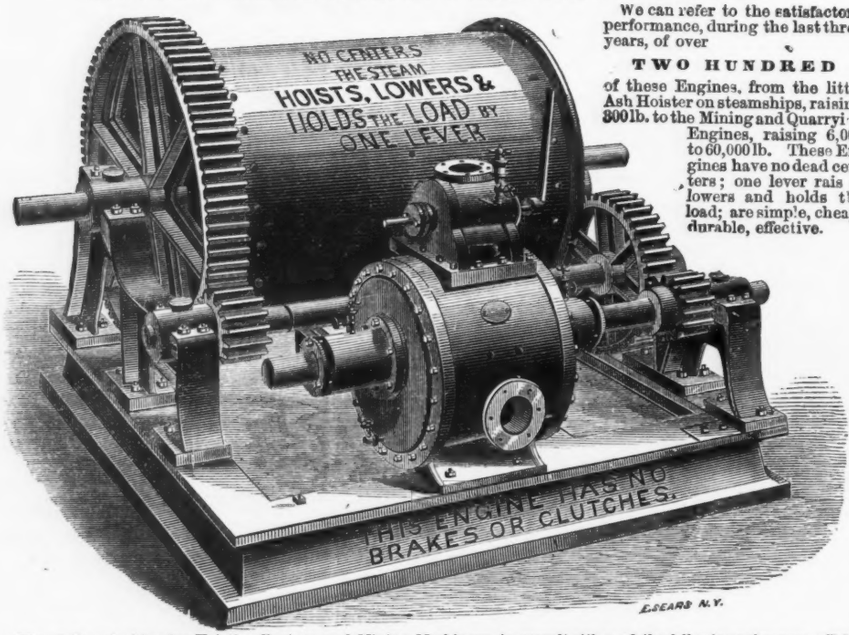


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